INTRODUCTION

TO

MATERIA MEDICA

AND

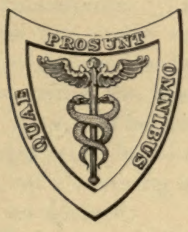
PHARMACOLOGY

INCLUDING
THE ELEMENTS OF MEDICAL PHARMACY, PRESCRIPTION WRITING, MEDICAL LATIN, TOXICOLOGY, AND METHODS OF LOCAL TREATMENT

BY

OLIVER T. OSBORNE, M. A., M. D.

Professor of Materia Medica, Therapeutics and Clinical Medicine in the Yale University; Ex-President of American Therapeutic Society; Ex-Chairman of the Section on Pharmacology and Therapeutics of the American Medical Association.



LEA BROTHERS & CO.
PHILADELPHIA AND NEW YORK
1906

PREFACE.

The object of this book is to introduce the student to the study of Pharmacology and Therapeutics, with the purpose constantly in mind of preparing him for the practice of medicine, *i. e.*, to care for the sick.

The section on Experimental Pharmacology is, perhaps, too brief, but is intended only as an introduction to the laboratory course which is now offered by most schools. The following section, on known Actions of the Important Drugs, is arranged alphabetically to allow the instructor free choice of the drug he will first demonstrate, and the student a ready reference to the physiologic action of that drug.

The section on Pharmacy and the Pharmacopœia is intended to offer captions for as many pharmacy lectures or demonstrations as the curriculum of a school provides for, and to explain the important preparations of the United States Pharmacopœia. The doses of the pharmacopœial preparations are made *smooth* for both systems, and preparations are grouped according to the size of the doses, this, perhaps, being the best means of helping students to remember them. The latter part of this section is for reference, especially for doses.

The next section, on Poisoning and its Treatment, is for reference or study, as desired.

The section on Weights and Measures, Latin Abbreviations, Prescription Writing and Dosage, is intended to introduce the subject of writing prescriptions, which can, of course, only be perfected by continued practice throughout the course in Pharmacology and Therapeutics.

The next section briefly describes the various methods of locally treating different parts of the body. These methods are, perhaps, better placed in a book of this introductory type, than in a large book devoted to the study of the physiologic action of drugs and their therapeutic application.

It is a pleasant duty to acknowledge the invaluable cooperative work done in preparing this book by my associate, Dr. William Hill Bean, Assistant in the Medical Clinic. I also wish to thank, for their valuable suggestions, Lafayette B. Mendel, Professor of Physiological Chemistry; Yandel Henderson, Assistant Professor of Physiology, and Clarence G. Spalding, Demonstrator of Pharmacy.

O. T. O.

CONTENTS.

Pharmacology and Prescription Writing.

INTRODUCTION.

Materia Medica is that branch of medical science which treats of the substances used as medicine, their origin, physical and chemical properties, physiologic and toxicologic action, preparations, doses, and methods of administration.

Therapeutics (*θεραπεύειν*—to cure) is that branch of medicine which treats of the remedial measures used in the management of disease.

Toxicology (Τοξικόν—poison; λόγος—discourse) is that branch of medical science devoted to the study of poisons.

Pharmacology (*φάρμακον*—medicine; λόγος—discourse) is the science of the chemical nature and physiologic action of drugs.

Experimental Pharmacology is the investigation and demonstration of the action of drugs on living tissues.

CHAPTER I.

PHARMACOLOGY.

PHYSIOLOGIC ACTION OF DRUGS.

Experimental Pharmacology.—Physiology teaches that the functional activities of the cells which compose the tissues of the body are dependent on the chemical reactions occurring in the living protoplasm.

It is probable that most drugs produce changes in the tissues by modifying these chemical reactions. Chemical changes may be brought about by a drug precipitating proteid, as metals do albumin, or by causing such changes in a proteid molecule that it reacts abnormally to the other cell constituents, or a drug being absorbed into a cell or tissue may change the osmotic condition of the protoplasm of that cell or tissue. It is now recognized that it takes but slight change in the molecular concentration or in the plasma constituency of a cell to greatly alter its chemical relation to the surrounding cells or fluids.

A drug in *minute doses* may cause no noticeable effect, though if long continued, even if the whole amount taken be very small, positive effects on the system may occur, especially on the various glands of the body, on the blood, or on metabolism. A slightly larger dose given for some time would cause this physiologic change sooner. The minimum dose of a drug that will produce physiologic symptoms is said to show pharmacologic action, and such action represents *the primary physiologic effect* of the drug, and this action can be demonstrated on living tissues. Such doses are physiologic doses, and if not too long continued or too frequently administered do no harm.

Doses larger than that which will produce a primary physiologic action cause more marked symptoms and finally poisoning, in the broad sense of the term, and the results are more or less *toxic,* depending upon the drug. The results of such large poisonous doses are sometimes apparently directly opposite to the action of small doses of the same drug, though careful investigation of the physiologic action of the drug will often show that it has stimulated other activities that overwhelm those caused by smaller doses rather than that there is an actual contrary action.

The physiologic study of toxic doses discloses the power of some drugs to prevent the poisonous action of others, i. e., antidotal action. An antidote to a toxic dose of a drug may be a chemical, physical or physiologic opponent. Hence, a drug or preparation that could by chemical reaction with a poison render the resulting combination inert, or by mechanical obstruction prevent the poison from acting, or being absorbed, or by physiologic action either could rapidly expel the poison from the body or could actually oppose the poison in the tissues of the body is an *antidote.*

By the *local action* of a drug is meant the action upon the part to which it is applied, *i. e.,* an action that takes place without absorption into the blood.

Many drugs cannot be absorbed, and, therefore, have local action only. Other drugs not only have positive local action, but are also absorbed and thus reach through the circulation the organs of the body upon which they have specific action. Still other drugs have no local action, and act only after absorption. Drugs that have local action exert it on the skin and on the mucous membranes, and if taken into the stomach may aid or interfere with digestion.

Drugs that are *absorbed into the blood* may modify it, act upon the heart, blood-vessels, nerve-centers, nerves,

muscles, lungs, liver, on the genito-urinary system, or on the organs of secretion. A drug may therefore act after absorption upon any one or upon all parts of the body, and the determination and localization of the action of the drug is the object of experimental pharmacology.

In investigating a drug it is of importance to note the length of time it takes for the drug to act, i. e., the *rate of absorption,* and this varies with the part of the body into which the drug is introduced.

The action of a drug is most rapid when it is injected into a vein, next when introduced into a serous cavity, next when injected deeply into the muscles, next when injected subcutaneously, next when absorbed from a mucous membrane (as from the mouth, empty stomach or rectum), next when given on a full stomach, and least rapidly when rubbed into the skin.

The liver retards and modifies the action of many drugs and most alkaloids, hence the doses of such drugs required to produce physiologic effects are greater when they are given by the mouth than when they are given hypodermatically.

It is next of importance to note where and in what form the drug is *excreted,* and how long before it is all excreted.

What is termed the primary and secondary action of a drug should be noted. The *primary action* is that for which the drug is used and for which its action is sought. The *secondary action* is a late effect of a drug, which may not be desired. For instance, the primary action of mor phine is to stop pain and produce sleep, and the secondary action may be to cause loss of appetite and constipation.

Some few drugs when given for a certain length of time in small physiologic doses, i. e., doses that produce certain positive effects, tend to accumulate in the system, and there may later be definite signs of too great an effect from the drug, though the symptoms will not be exactly

toxic. This is generally caused by a too frequent administration of the drug to allow complete excretion of the previous doses. This *cumulative action* as it is called can occur only with drugs which are excreted slowly, such as digitalis. Other drugs tend to accumulate in the system, notably the metallic, which are deposited in the various organs of the body. Such drugs do not cause what is termed cumulative action, but if a considerable amount is taken of another drug which acts as a solvent to them, or if such a solvent be suddenly developed in the system, large enough quantities of the deposited metals can be liberated to cause marked physiologic symptoms.

The amount of a drug that will cause definite symptoms or signs of its physiologic activity will vary, not only with the solubility of the drug and the manner in which it is administered, but also with the species of animal, with its size and age, and with individuals of the same class. This last variation is termed *idiosyncrasy,* which we generally recognize as an increased susceptibility, though frequent instances occur of diminished sensibility to a drug.

Other factors that modify the activity of a given dose are climate, temperature of the body, chemistry of foods and minerals that may be in the stomach when the medicine is given by the mouth, and what is termed *tolerance.* Tolerance to a certain drug or class of drugs may be inherent in races or certain animal species, or it may be individual, a kind of idiosyncrasy, or it may be acquired by individuals, especially for certain drugs of the narcotic class. In such individuals a much larger dose than ordinarily should produce physiologic symptoms will be needed to cause such action.

Certain diseased conditions may also modify the susceptibility of an individual to a drug, in some instances requiring the dose to produce physiologic symptoms to be larger, and in other instances smaller than the ordinary dose.

EARLY PHARMACOLOGIC RESEARCH.

Though many centuries ago clinical notes were taken and occasionally some experiments were made to discover the physiologic action of drugs, nothing scientific was accomplished or recorded until Magendie published his experiments, in 1816.

He found that strychnia in solution could be absorbed from mucous surfaces, rapidly from serous cavities, and slowly from an isolated loop of intestine. He proved by his famous experiment of dividing all of the structures of a dog's leg and connecting the severed ends of the main artery and vein with quills, and then injecting strychnia into this severed leg, that the convulsions caused by strychnia were due to the action of the drug on the central nervous system, which it reached through the blood. He next found that the nearer to the central nervous system the blood current was into which the strychnia was injected, the more quickly the convulsions developed.

Since convulsions may be caused by action of a drug on the brain, spinal cord, or muscles, Magendie's next problem was to prove on which part the strychnia acted. He first destroyed the spinal cord at the moment the poison was injected, and no convulsions occurred, thus demonstrating that the strychnia did not act upon the brain to cause convulsions. He next showed that while strychnia convulsions were occurring they could be stopped by passing a whalebone down the spinal canal, the convulsions ceasing in the parts of the body innervated by the section of the cord thus destroyed and continuing in the parts innervated from below such destruction.

Magendie then placed a little of a solution of strychnia on a portion of exposed spinal cord, and convulsions soon began, first in the parts of the body innervated by the section of the cord to which the poison was applied, and

later, after absorption into the circulation had taken place, the convulsions became general.

In thus demonstrating that strychnia can be absorbed, conveyed by the circulation, and act upon the motor tract of the spinal cord, Magendie has well earned the title of NESTOR of Pharmacologic Research.

In 1884, Claude Bernard, a pupil of Magendie, published his classic investigations of the paralyzing power of curare on the terminal endings of the motor nerves. He showed that this drug is not very poisonous when administered by the stomach if the kidneys are intact, but that it causes general paralysis when injected into the tissues of the body. Bernard proved that curare acted principally upon the terminal endings of the motor nerves by ligating the artery and vein of one leg of a frog, and then injecting the poison under the skin of the back. The blood could distribute the curare into all parts of the body except the ligated leg. Irritation of any part of the frog caused movements only in the ligated leg, thus showing that the sensory nerves could transmit stimuli to the cord and the latter could reflexly transmit them to the motor nerves, but the only muscles that received the stimuli and contracted were those of the leg which the curare could not reach.

Following these early investigators is a long line of tireless workers who have scientifically developed our modern treatises on pharmacology and have taught clinicians to meet therapeutic indications rationally.

DRUGS FOR DEMONSTRATION.

The characteristic physiologic activities of the following drugs can be demonstrated in the laboratory:

1. *Drugs which act locally on muscle-tissue.*
   - Atropine (mydriatic)
   - Eserine (myotic)
   - Muscarine
   - Potassium Salts
   - Veratrine
2. *Drugs which act locally on nerves.*
   - Atropine
   - Cocaine
   - Curare
3. *Drugs which act locally on the stomach to cause vomiting.*
   - Copper Sulphate
   - Ipecac
   - Zinc Sulphate
4. *Drugs which act locally on the intestines to cause purging.*
   - Croton Oil
   - Magnesium Sulphate
   - Rhubarb
5. *Drugs which act locally to destroy tissue.*
   - Acids
   - Alkalies
6. *Drugs which, after absorption, act on the heart.*
   - Aconite
   - Atropine
   - Digitalis
   - Nicotine
   - Strophanthus
   - Veratrine

7. *Drugs which, after absorption, act on the blood vessels.*

   Alcohol
   Ergot
   Nitrites
   Physiologic Salt Solution
   Suprarenal

8. *Drugs which, after absorption, act on the nervous system.*

   Alcohol
   Apomorphine (on the vomiting center)
   Atropine
   Caffeine
   Chloral
   Cocaine
   Morphine
   Phenol
   Strychnine

9. *Drugs which are anesthetics.*

   Chloroform
   Ether
   Nitrous oxide

10. *Drugs which, after absorption, act on the kidneys.*

    Caffeine
    Digitalis
    Methylene Blue
    Sparteine
    Theobromine

11. *Drugs which, after absorption, act on glands.*

    Atropine
    Iodides
    Mercury
    Pilocarpine

METHOD OF RECORDING EXPERIMENTS.

In experimentation with any of the above drugs the following data should, if possible, be recorded in notebooks in the order named:

Date, species, breed, and physical condition of the animal used for experiment; its age, sex, and weight. The anesthetic used and the length of time of the anesthesia. The drug, preparation of it and dose used, and how and where administered. The length of time after its administration before the first symptoms of its actions are noted. The character, depth, and frequency of the respirations; the rate of the heart beat and the blood pressure, if taken, should all be recorded at intervals designated by the instructor. Vomiting, purging, and urination should all be noted. The length of time the dose acts should be recorded, if noted, and if the animal lives the rate of excretion of the drug and when completely eliminated, if such examinations are made.

Special examinations of special functions instituted by the instructor should also be carefully recorded after the above data.

In the following section the principal physiologic activities of the drugs are indicated, all of which can be experimentally demonstrated. An alphabetical arrangement has been adopted for convenience:

Aconite. —The tincture is the preparation of aconite most used.

It has little action on the unbroken skin, but causes secretion. It is quickly ebsorbed from mucous membranes from which it is quickly absorbed. It slows and weakens the heart, dilates the arterioles and lowers the blood pressure. It dulls the sensibility of the peripheral nerves, and in toxic doses causes death by paralyzing the heart.

It is excreted in the urine.

Alcohol.—Official "alcohol" contains 92.3 per cent. by weight of absolute ethyl alcohol.

It is slightly irritant to the skin, tending to dry up its secretion. It is quickly absorbed from mucous membranes, which it irritates if not diluted. It quickens the heart, dilates the arterioles, especially of the surface vessels, causing perspiration and loss of heat. It lowers the blood pressure, stimulates and excites the brain, and in toxic doses causes coma and death by paralysis of the central nervous system.

It is excreted in the urine and in the breath, though some of it is burned in the system.

Apomorphine.—This drug is prepared from morphine by the abstraction of its molecule of water, and is used as the hydrochloride.

In solution it is rapidly absorbed from mucous membranes, but is largely used hypodermatically.

It acts as an emetic by irritating the vomiting center in the medulla. The other symptoms of its action are those of prostration, heart failure being the cause of death from a toxic dose.

Arsenic.—Arsenic is used in the form of the trioxide.

It has no action on the unbroken skin except there is long exposure. It is intensely irritant and corrosive to mucous membranes, hence it is one of the corrosive poisons, causing violent vomiting, purging and ulceration. It is slowly absorbed and slowly excreted, readily depositing in the organs of the body. It causes death in acute poisoning by acting reflexly through the pneumogastric nerves to paralyze the heart.

It is eliminated principally in the urine, and may cause nephritis by irritating the kidneys.

Atropine.—Atropine is the alkaloid of belladonna and is generally used as the sulphate.

It has no action on the unbroken skin, but is readily absorbed from mucous surfaces. It quickens the heart,

contracts the blood vessels, excites the brain, dulls the irritability of the peripheral sensory nerves, increases intestinal peristalsis, dilates the pupils and dries up secretions. It causes death by paralyzing the respiratory center.

It is eliminated slowly in the urine.

Bromides.—Potassium or sodium bromide are the salts most used. They have no action on the skin, and are mildly irritant to mucous membranes from which they are absorbed. They depress the heart, quiet the brain, causing sleep, and depress the spinal cord, inhibiting its motor activity. They cause death by paralyzing the nerve centers.

They are excreted slowly, principally in the urine, partially by the skin.

Caffeine.—This is the alkaloid of tea and coffee, and is mostly used as the citrated caffeine.

It has no action on the skin or mucous membranes, but is readily absorbed from the latter.

It stimulates and strengthens the heart, raises the blood pressure, stimulates the brain, and increases the activity of the kidneys. Poisonous doses cause great cerebral and nervous excitation, rapid heart, and respiratory failure.

It is excreted in the urine.

Chloral.—Chloral is used in the form of the hydrate.

It is irritant to the skin and mucous membranes, and is quickly absorbed from the latter.

It depresses the heart, quiets the brain, causing sleep, depresses the spinal cord, especially its motor activity, dulls the irritability of nerves, and causes death by paralysis of the central nervous system.

It is eliminated, principally, in the urine.

Chloroform.—Chloroform consists of 99 per cent. by weight of absolute chloroform and 1 per cent. of alcohol.

It is irritant to the skin and mucous membranes, and, vaporizing when exposed to the air at ordinary temperatures, is administered by inhalation. It stupefies the

brain and so produces complete anesthesia. It depresses the heart and finally causes paralysis of the respiratory center.

It is largely excreted in the breath, though some of it is probably burned in the system.

Cocaine.—Cocaine is the alkaloid of coca, and is used as the hydrochloride.

It has no action on the unbroken skin, but is absorbed readily from mucous membranes, which it anesthetizes.

Its principal action is as a local anesthetic, benumbing the peripheral sensory nerves. After absorption it slightly stimulates the heart, contracts the blood vessels, stimulates and excites the brain, and applied locally dilates the pupils. Toxic doses cause death by paralysis of the respiratory center.

It is excreted in the urine.

Coniine.—Coniine is a volatile fluid alkaloid of hemlock (conium).

It is somewhat irritant to the skin and mucous membranes, and is absorbed from the latter. It acts upon the terminations of the motor nerves causing muscular paralysis, while the brain may remain clear until respiration fails. It causes nausea and vomiting, and has but little effect on the circulation. Death is due to paralysis of the respiratory muscles.

It is rapidly excreted in the urine.

Curara.—Curara, Curare, or Woorari, is an arrow poison used by the South American Indians.

It has no action on the external skin, but is absorbed from mucous membranes. It paralyzes the end-plates of the motor nerves, inhibiting the transmission of nervous stimuli to the muscles.

Death is due to paralysis of the muscles of respiration.

It is excreted in the urine.

Digitalis.—Digitalis is used most frequently in the form of the tincture.

It has no action on the skin or mucous membranes, but is readily absorbed from the latter.

It slows and strengthens the heart, contracts the blood vessels, raises the blood pressure, and increases the excretion of the urine. In toxic doses the heart becomes rapid and death is caused by excessive stimulation of the cardiac muscle.

It is excreted slowly in the urine.

Ergot.—Ergot of rye is used mostly in the form of the fluid extract.

It has no action on the skin or mucous membranes, and is absorbed slowly from the latter. It contracts the blood vessels and raises the blood pressure. It stimulates the uterine muscle fibres, causing a dilated uterus to contract.

It is excreted, principally, in the urine.

Ether.—Ether contains 96 per cent. by weight of absolute ether and 4 per cent. of alcohol and water.

It is slightly irritant to the skin and mucous membranes. It becomes volatile when exposed to the air at ordinary temperatures, and is therefore administered by inhalation. It dulls and stupefies the brain, producing anesthesia. It primarily stimulates the heart and raises the blood pressure. In toxic doses it causes cardiac failure and death by respiratory paralysis.

It is excreted in the breath.

Iodides.—Potassium and sodium iodide are the forms most used.

They have no action on the skin, are slightly irritant to mucous membranes, from which they are quickly absorbed. They increase the secretion of mucous membranes and the salivary and thyroid glands.

They are excreted in the urine, in the saliva, and by the skin.

Magnesium Sulphate.—Magnesium sulphate has no action on the skin or mucous membranes. It is very slowly absorbed, and causes a watery exudate into the intestines resulting in purging.

It is excreted mostly in the fæces and in small amount in the urine.

Mercury.—Most preparations of mercury are irritant to the skin and mucous membranes.

It is slowly absorbed, causing purging and salivation.

Poisoning by irritant preparations, as corrosive sublimate, causes violent vomiting and purging, and death is produced by reflex cardiac failure from irritation of the pneumogastric nerves in the stomach. Inhalations of fumes of mercury produce general paralysis.

It is excreted in the fæces, saliva, and urine.

Methylene Blue.—The "hydrochloride of methylthionine" is the official title.

It has no action on the skin, but is slightly irritant to mucous membranes, from which it is readily absorbed.

It is quickly excreted in the urine, coloring the latter blue or green. It is also sometimes excreted in the saliva.

Morphine.—Morphine is the most important alkaloid of opium, and is generally used as the sulphate.

It has no action on the skin or mucous membranes, but is quickly absorbed from the latter.

In animals it stimulates the spinal cord, but in man it quiets and stupefies the brain, finally producing coma. It slightly dulls the sensibility of the sensory nerves, but stops sensation mostly by action on the cerebral nerve centers. It slows the respiration by acting on the respiratory center, dries up secretions, and stops peristalsis. It produces death by paralyzing the respiratory center.

It is excreted into the stomach and in the urine.

Muscarine.—Muscarine is an alkaloid of a poisonous mushroom. It is hard to obtain pure, and therefore is not used in medicine.

Its action is quite similar to pilocarpine.

Nicotine.—Nicotine is the alkaloid of tobacco, and is used as nicotine only experimentally. It is a very poisonous volatile fluid, very irritant to the skin and mucous membranes, and is absorbed from the latter.

It produces nausea, vomiting, and purging. It causes cardiac depression, lowers the blood pressure, and increases secretion, especially the perspiration. It contracts the pupils, depresses the motor nerves and spinal cord, and paralyzes the heart. It causes death by respiratory paralysis.

It is excreted in the urine, saliva, and perspiration.

Nitrites.—Amyl nitrite, nitroglycerin, and sodium nitrite are the forms most used.

They do not act on the skin, but are more or less irritant to mucous membranes. The first two are rapidly absorbed and quickly show physiologic action. Amyl nitrite being very volatile is generally administered by inhalation.

They stimulate the heart, dilate the blood vessels, cause throbbing in the head and flushing of the face. They are rapidly broken up in the system, and their activity is of but short duration. Very large doses can produce death by causing changes in the blood, and vasomotor and respiratory paralysis.

These substances are rapidly changed in the system into nitrates, and are excreted in the urine as such.

Nitrous Oxide.—Nitrous oxide gas is used to produce anesthesia.

It prevents oxygenation of the blood, raises the blood pressure, and causes asphyxia by oxygen starvation. Death is caused by paralysis of the respiratory center. Very small doses are stimulant and excitant to the brain.

Phenol.—Phenol (carbolic acid) is very irritant to the skin, causes blisters and even necrosis. The same is true of mucous membranes, from which it is quickly absorbed.

It causes convulsions in many animals, followed by coma; in man, generally coma only. It is depressant to the heart and lowers the temperature, irritates the kidneys and may cause nephritis. Locally it is an anesthetic benumbing the peripheral sensory nerves. It is a very

potent poison to the nervous system, paralyzing the nerve centers.

Death may occur in a few moments from "shock" or later from respiratory paralysis.

It may be partially oxidized in the system, but is mostly excreted in the urine.

Physiologic Saline Solution.—This is distilled water containing .9 per cent. of sodium chloride. It is soothing to the skin and mucous membranes. When injected into the blood vessels it raises the blood pressure and stimulates the heart.

Pilocarpine.—Pilocarpine is an alkaloid of pilocarpus (jaborandi) and is used mostly as the hydrochloride.

It has no local action on the skin or mucous membranes, but is readily absorbed from the latter.

It stimulates the secretory glands, especially the salivary, sudoriparous, pancreatic and lachrymal. It increases peristalsis, contracts the pupils, and depresses the heart. It causes death by depression of the respiratory center.

It is excreted mostly in the sweat, a little in the urine.

Sparteine.—Sparteine is the alkaloid of broom (scoparius) and is used in the form of the sulphate.

It has no action on the skin and mucous membranes, but is rapidly absorbed from the latter. It slows the heart and soon weakens it, and has a slight stimulant action on the kidneys. In poisonous doses it paralyzes the nervous system, causing death by paralysis of the respiratory center.

It is excreted rapidly in the urine.

Strophanthus.—Strophanthus is used generally as the tincture.

It has no action on the skin, but is irritant to mucous membranes, from which it is rapidly absorbed.

It strengthens the heart, slightly contracts the blood vessels, raises the blood pressure, and is mildly diuretic. It

is a muscle poison, and causes death by over-stimulating the heart-muscle, the heart stopping in systole.

It is excreted in the urine.

Strychnine.—Strychnine is the alkaloid of nux vomica, and is generally used as the sulphate or nitrate.

It has no action on the skin or mucous membranes, but is readily absorbed from the latter.

It is a stimulant to the heart, contracts the blood vessels, stimulates the brain and spinal cord, and especially the respiratory and vasomotor centers. In poisonous doses it causes convulsions by over-stimulating the spinal cord. It causes death by tetanus.

It is excreted in the urine.

Suprarenal.—This substance is prepared from the suprarenal glands of sheep, and is used in the form of a watery extract or as an active principle under the name of adrenalin or suprarenalin.

It has no action on the skin, but it blanches mucous membranes by causing contraction of the blood vessels. If the solution is injected hypodermatically, intravenously, or if it is absorbed from mucous membranes other than that of the gastrointestinal canal it stimulates the heart, contracts the arterioles, raises the blood-pressure, and tones up the muscular system. The increase in blood pressure is, however, of short duration. Large doses depress the respiratory center.

Theobromine.—Theobromine is a purin derivative.

It acts quite similarly to caffeine, but is much more of a diuretic.

It is excreted in the urine.

Veratrine.—Veratrine is a mixture of alkaloids obtained from the seed of certain veratrum plants.

It is a powerful poison, first irritant, then benumbing to the skin, and is exceedingly irritant to mucous membranes.

It causes vomiting and purging, slows the pulse, weak-

ens the heart and lowers the blood pressure. It paralyzes the termination of the motor nerves, but is stimulant to striated muscles. Death is caused by paralysis of the respiratory center.

CHAPTER II.

PHARMACY.

Pharmacognosy (φάρμακον, γνῶσις, knowledge) is the science of the physical properties and chemical characters of crude drugs.

Pharmacy (φάρμακον) is the art of preparing medicinal preparations.

A Dispensatory is a reference book of *materia medica*, pharmacology, official and unofficial preparations and their doses.

A Pharmacopœia (φάρμακον ποιεῖν, to make) is an authoritative hand-book of medicinal preparations.

Expression is the process of forcibly separating a liquid from a solid.

Filtration is the process of separating a solid from a liquid by the intervention of a substance through which the former will not pass.

Solution is the process of changing a substance from a solid or gaseous state to a liquid by the action of a liquid.

Maceration is the process of soaking a drug in a menstruum until the soluble portions are all in solution.

Percolation (*percolare*, to strain through) is the process by which the soluble portions of a drug are separated from it by the descent of a solvent through it.

Evaporation is the process of driving off from a substance volatile portions by the aid of heat.

Distillation is the process of changing a substance into a gas and condensing it again by cooling.

Chemical Reaction is the combination of substances by changing their molecular structure.

Standardizing is the specification by the pharmacopœia

of the proportion of active ingredient which each drug must possess in order to be official.

Crude Drugs are the parts of plants, shrubs or trees which experience has proved to have medicinal virtues. These vegetable drugs and their preparations are called Galenical.

Alkaloids (al—the; kali—a plant containing much soda; εἶδος—resemblance), are the active principles of vegetable drugs. They are basic in character, form salts with acids, are insoluble in water, soluble in alcohol, and are precipitated by tannic acid. Their salts are soluble in water and many are insoluble in alcohol. Their pharmacopœial Latin names always end in *ina*.

Glucosides are vegetable principles which are readily decomposed into glucose and some other substance or substances. Their pharmacopœial Latin names always end in *inum*.

Balsams are terms applied to viscid, aromatic exudates from plants consisting of a mixture of resin and a volatile oil. They are insoluble in water and soluble in alcohol.

Gums are thick viscid exudates from plants which harden on exposure to the atmosphere. They are insoluble in alcohol, and soluble in, or at least softened by, water.

Gum Resins are mixed exudates of gums and resins.

PHARMACOPŒIA.

The title of a book, published by a local or national authority, which gives the drugs and preparations (together with their strength and the mode of preparation) that shall be used in filling the prescriptions of physicians.

Though a number of documents and books on *materia medica,* that were authorities for formulas, were published from early times down to a recent period, there were no regular pharmacopœias until the beginning of the 16th century, and it was not until the last century that national pharmacopœias appeared in the different countries.

Though England, Scotland and Ireland had long possessed national pharmacopœias, the first British pharmacopœia was published in 1864, and the last one bears the date of 1898.

The first national pharmacopœia of France appeared in 1818, though many cities had such pharmacal authority before.

The different German states had separate pharmacopœias, but the German national pharmacopœia, or "Pharmacopœia Germanica," was first published in 1872, and the last edition in 1900.

Italy had the earliest pharmacopœia of any country, its first one bearing the date of 1498.

Russia's first national pharmacopœia bears the date of 1866.

The first national pharmacopœia of Spain appeared in 1794.

Sweden's first pharmacopœia appeared in 1775, and the last revision was in 1879, though several amended editions have appeared since.

The first attempt at a pharmacopœia in the United States was published in 1778, at Philadelphia, for the use of the military hospital of the United States Army.

The first convention for the formation of a national pharmacopœia for the United States met at Washington, in 1820, and the result of their work was published, in Boston, at the end of the same year. The second edition appeared in 1828, and from 1830 there have been decennial conventions of representatives from the professions of medicine and pharmacy with delegates from state medical societies, medical and pharmaceutical colleges, and from the army, navy and marine hospital service of the United States. At these conventions, held in Washington, are appointed Revision Committees, whose labors develop the decennial editions of the pharmacopœia.

The present pharmacopœia is the result of the revision

committee appointed in 1900, and is known as the "Eighth Decennial Revision" of the "United States Pharmacopœia." All drugs and preparations appearing and described in this book are termed *official.* In other words, to be official in this country a drug must appear in the United States Pharmacopœia.

United States Pharmacopœia of 1900.

In the following list of pharmacopœial preparations only the most important preparations of the most important drugs are mentioned. They are classed as poisonous and non-poisonous, and are then named, as far as possible, in the order of the size of their doses.

As the measure of a dose the "teaspoon," though only approximately accurate, is a useful means of administration. Teaspoons are not of uniform capacity, but always hold about five cubic centimeters (5 c. c.) in the Metric system, and about one fluidrachm (fl. ʒ i) in the old system.

A "drop" is so constantly inaccurate, that it should be discarded, and is discarded in this book.

The doses are given in even figures or in integers in both systems and are not translated from one to the other. Consequently the dose in one system is only approximately equivalent to the dose in the other.

Pharmacopœial Preparations.

Official, September 1, 1905.

Aceta (*Vinegars*) are solutions of the active principles of drugs in dilute acetic acid.

They are made by maceration and percolation.

Two *aceta* are official, and both are strong preparations.

Aquæ (*Waters*) are as nearly as practicable saturated solutions of volatile substances in water.

They are made:

1. By solution in cold water.
2. By solution in hot water.
3. By filtration through an absorbent powder containing the drug.
4. By percolation through cotton saturated with the drug.
5. By distillation.

Seventeen *aquae* are official.

Aqua Camphoræ..... Dose, 10 c. c. or fl. ʒ ij

Preparations Used for Flavoring and Dilution.

Aqua Chloroformi .....Dose, 15 c. c. or fl. ʒ iv
Aqua Cinnamomi .....Dose, 15 c. c. or fl. ʒ iv
Aqua Menthæ Piperitæ.....Dose, 15 c. c. or fl. ʒ iv
Aqua Menthæ Viridis.....Dose, 15 c. c. or fl. ʒ iv
Aqua Rosæ .....Dose, 15 c. c. or fl. ʒ iv

Preparations Used Externally.

Aqua Ammoniæ,
Aqua Hydrogenii Dioxidi.

Cerata (*Cerates*) are semi-solid preparations intended for external use. They do not melt when applied to the skin.

Their usual base is wax and lard, and they are made by melting together their ingredients and stirring while cooling.

Six *cerata* are official.

Ceratum (white wax 30%, white petrolatum 20%, benzoinated lard 50%.)

Collodia (*Collodions*) are liquid preparations for external use, having collodion as a base.

They are made by solution.

Four *collodia* are official.

Collodium (gun cotton 4%, ether 75%, alcohol 25%).
Collodium Cantharidatum (60%), to blister.
Collodium Flexile (contains 3% of castor oil).
Collodium Stypticum (contains 20% of tannic acid).

Confectiones (*Confections*) are sweet, semi-solid preparations in which one or more medicinal substances are incorporated.

They are made by mechanical mixture.

Two *confectiones* are official. Both are unimportant.

Decocta (*Decoctions*) are liquid preparations made by boiling vegetable substances in water.

Unless otherwise ordered, decoctions are made of five per cent. strength.

There are no official *decocta*.

Elixira (*Elixirs*) are sweet, aromatic, alcoholic preparations containing small amounts of medicinal substances.

They are made by solution.

Three *elixira* are official.

Elixir Aromaticum (used as a vehicle).
Elixir Ferri, Quininæ et Strychninæ Phosphatum.
Dose, 5 c. c. or fl. ʒ j

Emplastra (*Plasters*) are preparations for application to the skin and are adhesive at the body temperature.

They are made by spreading semi-solid substances on muslin, leather or rubber.

Seven *emplastra* are official.

Emplastrum Adhæsivum (surgeon's plaster).
Emplastrum Belladonnæ (30%, sedative, can cause physiologic action).
Emplastrum Capsici (mildly irritant).
Emplastrum Plumbi (lead plaster, "diachylon plaster," stimulant).

Emulsa (*Emulsions*) are liquid preparations in which oily substances are suspended in water by the aid of a gummy or albuminous substance.

They are made by agitation.

Six *emulsa* are official.

Emulsum Terebinthinæ .....Dose, 5 c. c. or fl. ʒ j
Emulsum Chloroformi .....Dose, 10 c. c. or fl. ʒ ij
Emulsum Olei Morrhuæ.....Dose, 10 c. c. or fl. ʒ ij
Emulsum Olei Morrhuæ cum Hypophosphitibus .....Dose, 10 c. c. or fl. ʒ ij
Emulsum Asafœtidæ .....Dose, 15 c. c. or fl. ʒ iv

Extracta (*Extracts*) are solid or semi-solid concentrated preparations used mostly for internal medication and best administered in pill or capsule.

They are made by evaporating the fresh juice of a drug or by dissolving out the active principles of a drug with alcohol or water and evaporating the liquid to the proper consistency.

Twenty-eight *extracta* are official.

Poisonous.

Extractum Belladonnæ Foliorum	Dose, .01 gm. or gr. ⅙.
Extractum Cannabis Indicæ	Dose, .01 gm. or gr. ⅙.
Extractum Digitalis	Dose, .01 gm. or gr. ⅙.
Extractum Nucis Vomicæ	Dose, .01 gm. or gr. ⅙.
Extractum Physostigmatis	Dose, .01 gm. or gr. ⅙.
Extractum Stramonii	Dose, .01 gm. or gr. ⅙.
Extractum Opii	Dose, .03 gm. or gr. ½.
Extractum Rhamni Purshianæ	Dose, .05 gm. or gr. j
Extractum Hyoscyami	Dose, .05 gm. or gr. j

Non-Poisonous.

Extractum Euonymi	Dose, .10 gm. or gr. ij
Extractum Ergotæ	Dose, .25 gm. or gr. iv
Extractum Rhamni Purshianæ (Cascara Sagrada)	Dose, .25 gm. or gr. iv
Extractum Sumbul	
Extractum Colocynthidis Compositum	Dose, .25 gm. or gr. iv

Fluidextracta (*Fluidextracts*) are concentrated liquid preparations of organic drugs, mostly for internal administration, and made of such strength that one cubic centimeter shall represent the medicinal properties of one gram of the drug.

They are made by percolating a finely divided drug in a menstruum containing more or less alcohol and then concentrating the percolate to the required strength.

Eighty-five *fluidextracta* are official.

Poisonous.

Fluidextractum Aconiti	Dose,	.05	c. c. or M j
Fluidextractum Belladonnæ Radicis	Dose,	.05	c. c. or M j
Fluidextractum Cannabis Indicæ	Dose,	.05	c. c. or M j
Fluidextractum Digitalis	Dose,	.05	c. c. or M j
Fluidextractum Gelsemii	Dose,	.05	c. c. or M j
Fluidextractum Lobeliæ	Dose,	.05	c. c. or M j
Fluidextractum Nucis Vomicæ	Dose,	.05	c. c. or M j
Fluidextractum Stramonii	Dose,	.05	c. c. or M j
Fluidextractum Phytolaccæ	Dose,	.10	c. c. or M iss
Fluidextractum Scillæ	Dose,	.10	c. c. or M iss
Fluidextractum Colchici Seminis	Dose,	.20	c. c. or M iij
Fluidextractum Conii	Dose,	.20	c. c. or M iij
Fluidextractum Hyoscyami	Dose,	.20	c. c. or M iij
Fluidextractum Convalariæ	Dose,	.50	c. c. or M viij
Fluidextractum Guaranæ	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Pilocarpi	Dose,	2.	c. c. or fl. ʒ ss

Non-Poisonous.

Fluidextractum Euonymi	Dose,	.5	c. c or M viij
Fluidextractum Podophylli	Dose,	.5	c. c or M viij
Fluidextractum Cubebæ	Dose,	1.	c. c. or M xv
Fluidextractum Rhamni Purshianæ (Cascara Sagrada)	Dose,	1.	c. c. or M xv
Fluidextractum Rhamni Purshianæ Aromaticum	Dose,	1.	c. c. or M xv
Fluidextractum Buchu	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Ergotæ	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Glycyrrhizæ	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Hamamelidis Foliorum	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Hydrastis	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Sennæ	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Sumbul	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Viburni Prunifolii	Dose,	2.	c. c. or fl. ʒ ss
Fluidextractum Spigeliæ	Dose,	5.	c. c. or fl. ʒ j
Fluidextractum Tritici	Dose,	10.	c. c. or fl. ʒ ij

Glycerita (*Glycerites*) are mixtures of medicinal substances with glycerine, generally for external use.

They are made by solution.

Six *glycerita* are official.

Glyceritum Phenolis (20%).
Glyceritum Acidi Tannici (20%).
Glyceritum Hydrastis.
Glyceritum Boroglycerini.
Glyceritum Amyli.

Infusa (*Infusions*) are weak liquid preparations for internal administration, made of 5 per cent. strength of the substance unless otherwise ordered.

They are made by treating a drug with hot or cold water.

Three *infusa* are official.

Infusum Digitalis.....Dose, 10. c. c. or fl. 3 ij

Linimenta (*Liniments*) are mostly liquid preparations for external use.

They are made by solution.

Eight *linimenta* are official.

For Sedative Action.

Linimentum Belladonnæ.
Linimentum Calcis (carron oil).

For Stimulant Action.

Linimentum Camphoræ (weakest).
Linimentum Saponis.
Linimentum Ammoniæ.
Linimentum Terebinthinæ (semi-solid).
Linimentum Chloroformi.
Linimentum Saponis Mollis (strongest).

Liquores (*Liquors*) are solutions of non-volatile substances in water, and are for both internal and external use.

They are made by:

1. Simple solution.
2. Chemical reaction.

Twenty-five *liquores* are official.

Poisonous.

Liquor Arseni et Hydrargyri Iodidi (Donovan's Solution) (contains 1% each of iodide of arsenic and red iodide of mercury)..Dose, .1 c. c. or M iss

Liquor Ammonii Acetatis (Fowler's Solution) (contains 1% of trioxide of arsenic) .....Dose, .2 c. c. or M iij

Non-Poisonous.

Liquor Potassii Hydroxidi (6%) .....Dose, 1. c. c. or M xv

Liquor Sodii Phosphatis Compositus .....Dose, 10. c. c. or fl. ʒ ij

Liquor Ammonii Acetatis (Spirits of Mindererus).Dose, 15. c. c. or fl. ʒ iv

Liquor Calcis .....Dose, 15. c. c. or fl. ʒ iv

Liquor Magnesii Citratis (effervescing) (prepared in bottles holding 360 c. c. (12 fluid ounces)).....Dose, ½ to the whole of the contents of the bottle.

Use Externally.

Liquor Antisepticus (mild alkaline for gargles, etc.).

Liquor Cresolis Compositus (50%), (for vaginal douche, etc.).....Must be diluted.

Liquor Formaldehydi (37%).Must be diluted.

Liquor Iodidi Compositus (Lugol's Solution) (for local application).

Liquor Plumbi Subacetatis ("Goulard's Solution") (to be diluted to 5% for external application).

Liquor Sodæ Chlorinatæ ("Labarraque's Solution").

Massæ (*Masses*) are semi-solid preparations of a proper consistency to roll into pills.

They are made by mechanical mixture and chemical reaction.

Two *massæ* are official.

Massa Ferri Carbonatis.....Dose, .25 gm. or gr. v.
Massa Hydrargyri .....Dose, .25 gm. or gr. v.

Mella (*Honeys*) are thick, liquid preparations with honey as a base.

They are made by mechanical mixture.

Three *mella* are official, and may be used as excipients.

Misturæ (*Mixtures*) are liquid preparations containing substances held in suspension in water.

They are made by mechanical mixture and chemical reaction.

Four *misturæ* are official.

Mistura Rhei et Sodæ.....Dose, 5. c. c. or fl. ʒ j
Mistura Glycyrrhizæ Composita (Brown Mixture)...Dose, 5. c. c. or fl. ʒ j
Mistura Cretæ (Chalk Mixture) .....Dose, 10. c. c. or fl. ʒ ij

Mucilagines (*Mucilages*) are solutions of gum in water. they are weak preparations used to soothe membranes or to suspend insoluble substances or oils in mixtures.

They are made by solution.

Four *mucilagines* are official.

Mucilago Acaciæ .....Dose, 10. c. c. or fl. ʒ ij or more
Mucilago Tragacanthæ .....Dose, 10. c. c. or fl. ʒ ij or more

Oleata (*Oleates*) are combinations of medicinal substances with oleic acid, intended for external use.

They are made by solution and mechanical mixture.

Five *oleata* are official.

Oleatum Atropinæ (2%).
Oleatum Cocainæ (5%).
Oleatum Hydrargyri (20%).

Oleoresinæ (*Oleoresins*) are extracts containing a volatile oil and a resin, and are intended for internal administration, though more or less irritant.

They are made by the action of ether on certain crude drugs.

Six *oleoresinæ* are official.

Oleoresina Cubebæ ..... Dose, .50 gm. or gr. viiss
Oleoresina Aspidii ..... Dose, 2. gm. or ʒ ss

Olea (*Oils*) are either volatile or fixed. The volatile oils are irritant and active; the fixed oils are bland and harmless.

They are made by distillation or expression.

Forty-five *olea* are official.

A large number of volatile oils are used for flavoring.

Oils Used Internally.

Oleum Tiglii (croton oil) .... Dose, .05 c. c. or M j
Oleum Eucalypti ..... Dose, .50 c. c. or M viij
Oleum Santali ..... Dose, .50 c. c. or M viij
Oleum Gaultheriæ (winter green oil) ..... Dose, 1. c. c. or M xv
Oleum Terebinthinæ Rectificatum (turpentine) ..... Dose, 1. c. c. or M xv
Oleum Morrhuæ (cod liver oil) ..... Dose, 10. c. c. or fl. ʒ ij
Oleum Ricini (castor oil) .... Dose, 15. c. c. or fl. ʒ iv

Oils and Fats Used Externally.

Oleum Sinapis Volatile (mustard oil).
Oleum Hedeomæ (pennyroyal oil).
Oleum Betulæ.
Oleum Gossypii Seminis (cotton-seed oil).
Oleum Lini (linseed oil).
Oleum Olivæ (sweet oil).
Oleum Cadinum.
Oleum Terebinthinæ.
Oleum Theobromatis (cacao butter).

Pilulæ (*Pills*) are small, solid, medicated bodies, usually spherical in shape, for internal administration.

Fourteen *pilulæ* are official.

To Act On the System.

Pilulæ Asafœtidæ (each contains .20 gm. (gr. iii) of asafœtida) .....Dose, one pill.

Pilulæ Ferri Carbonatis (Blaud), (each pill represents .065 gm. (gr. i) of iron) .....Dose, one pill.

Pilulæ Opii (each contains .065 gm. (gr. i) of opium) ....Dose, one pill.

Pilulæ Phosphori (each contains .0006 gm. (1-100 gr.) of phosphorus).....Dose, one pill.

To Act on the Bowels.

Pilulæ Aloes (each contains .13 gm. (gr. 2) of aloes).....Dose, one or two pills.

Pilulæ Aloes et Ferri (each contains of aloes and iron each, .07 gm. (gr. 1)).....Dose, one or two pills.

Pilulæ Aloes et Mastiches each contains .13 gm. (gr. 2) of aloes, and .04 gm. (gr. ½) of mastic).....Dose, one or two pills.

Pilulæ Aloes et Myrrhæ (each contains .13 gm. (gr. 2) of aloes, and .06 gm. (gr. 1) of myrrh).....Dose, one or two pills.

Pilulæ Catharticæ Compositæ (compound cathartic pill) (each contains extract of colocynth comp. .08 gm (gr. 1¼); calomel .06 gm. (gr. 1); resin of jalap .02 gm. (gr. ⅓); gamboge .015 gm. (gr. ¼) .....Dose, one or two pills.

Pilulæ Catharticæ Vegetabiles (vegetable cathartic pill), (each contains extract of colocynth comp. .06 gm (gr. 1); extract of hyoscyamus .03 gm. (gr. ½); resin of jalap .02 gm. (gr. ⅓); extract of leptandra .015 gm. (gr. ¼); resin of podophyllum .015 gm. (gr. ¼).....Dose, one or two pills.

Pilulæ Laxativæ Compositæ (each contains aloin .013 gm. (gr. 1-5); strychnine .0005 gm. (gr. 1-120); extract of belladonna leaves .008 gm. (gr. ⅛); ipecac .004 gm. (gr. 1-15) ..... Dose, one or two pills.

Pilulæ Podophylli, Belladonnæ et Capsici (each contains resin of podophyllum .016 gm. (gr. ¼); extract of belladonna leaves .008 gm. (gr. ⅛); capsicum .032 gm. (gr. ½) ..... Dose, one or two pills.

Pilulæ Rhei Compositæ (each contains rhubarb .13 gm. (gr. 2); aloes .10 gm. (gr. 1½); myrrh .06 gm. (gr. 1) ..... Dose, one or two pills.

Pulveres (*Powders*) are finely powdered preparations of two or more drugs, for internal administration.

Nine *pulveres* are official.

Pulvis Acetanilidi Compositus (contains 70% of acetanilide; 10% of caffeine; 20% of bicarbonate of soda) ..... Dose, .20 gm. or gr. iij

Pulvis Ipecacuanhæ et Opii (Dover's Powder), (contains 10% each of ipecac and opium) ..... Dose, .50 gm. or gr. viiss

Pulvis Morphinæ Compositus ("Tully's Powder") (contains 1½% of morphine and 32% of camphor) ... Dose, .50 gm. or gr. viiss

Pulvis Aromaticus (a mixture of aromatics) ..... Dose, 1. gm. or gr. xv

Pulvis Jalapæ Compositus (contains 35% of jalap, and 65% of potassium bitartrate) ..... Dose, 2. gm. or ʒ ss

Pulvis Glycyrrhizæ Compositus (Compound Licorice Powder), (contains 18% of senna; 23% of glycyrrhiza; 8% of sulphur) .. Dose, 4. gm. or ʒ j

Pulvis Rhei Compositus (Gregory's Powder) (contains 25% of rhubarb; 65% of magnesium oxide; 10% of ginger) .....Dose, 4. gm. or 3 j

Pulvis Effervescens Compositus (Seidlitz Powder) (each consists of two powders; one of Rochelle salt and bicarbonate of soda in blue paper, and the other of tartaric acid in white paper) .....Dose, one powder.

Resinæ (*Resins*) are solid preparations for internal administration.

They are made by distillation or by precipitation of certain tinctures with water.

Four *resinæ* are official, and all are cathartic.

Resina Podophylli .....Dose, .005 gm. or gr. 1-12
Resina Jalapæ .....Dose, .01 gm. or gr. ⅙
Resina Scammonii .....Dose, .20 gm. or gr. iij

Spiritus (*Spirits*) are strong solutions of volatile substances in alcohol, for internal administration.

They are made:

1. By simple solution.
2. By solution with maceration.
3. By gaseous solution.
4. By chemical reaction.
5. By distillation.

Twenty *spiritus* are official.

To Flavor.

Spiritus Ætheris .....Dose, 2. c. c. or fl. ʒ ss
Spiritus Anisi .....Dose, 2. c. c. or fl. ʒ ss
Spiritus Chloroformi .....Dose, 2. c. c. or fl. ʒ ss
Spiritus Gaultheriæ .....Dose, 2. c. c. or fl. ʒ ss
Spiritus Lavandulæ .....Dose, 2. c. c. or fl. ʒ ss
Spiritus Menthæ Piperitæ ...Dose, 2. c. c. or fl. ʒ ss

To Act On the System.

Spiritus Glycerylis Nitratis (Nitroglycerin) .....Dose, .05 c. c. or M j
Spiritus Ammoniæ .....Dose, 1. c. c. or M xv
Spiritus Camphoræ .....Dose, 1. c. c. or M xv
Spiritus Ammoniæ Aromaticus Dose, 2. c. c. or fl.ʒ ss
Spiritus Ætheris Nitrosi ... (Sweet Spirits of Nitre) .Dose, 2. c. c. or fl.ʒ ss
Spiritus Ætheris Compositus. (Hoffmann's Anodyne) ..Dose, 5. c. c. or fl. ʒ j
Spiritus Juniperi Compositus Dose, 10. c. c. or fl. ʒ ij
Spiritus Frumenti (whiskey), (contains 44% to 55% absolute alcohol) .....Dose, 10. c. c. or fl. ʒ ij
Spiritus Vini Gallici (brandy) (contains 46% to 55% absolute alcohol) .....Dose, 10. c. c. or fl. ʒ ij

Suppositoria (*Suppositories*) are medicated preparations, usually having cacao butter as a basis, moulded into proper form for introduction into one of the cavities of the body. The Pharmacopœia directs that suppositories for the rectum should weigh about 2. gm.; that suppositories for the urethra, termed bougies, should be pencil-shaped and weigh from 2. to 4. gm.; that vaginal suppositories should be globular or oviform in shape and weigh from 4. to 10. gm.

One *suppositorium* is official.

Suppositoria Glycerini (each contains 3. gm. (gr. xlv) of glycerine) .....For rectal administration.

Syrupi (*Syrups*) are concentrated solutions of sugar in water, medicated with one or more drugs, intended for internal administration.

Twenty-nine *syrupi* are official.

To Act On the System.

Syrupus Ipecacuanhæ (emetic) .....Dose, 15. c. c. or fl. ʒ iv
Syrupus Ipecacuanhæ (expectorant) .....Dose, .25 c. c. or M iv
Syrupus Ferri Iodidi.....Dose, 1. c. c. or M xv

Syrupus Scillæ	Dose,	2.	c. c. or fl. ʒ ss
Syrupus Scillæ Compositus (Hive Syrup)	Dose,	2.	c. c. or fl. ʒ ss
Syrupus Acidi Hydriodici	Dose,	5.	c. c. or fl. ʒ j
Syrupus Calcii Lactophosphatis	Dose,	10.	c. c. or fl. ʒ ij
Syrupus Hypophosphitum	Dose,	10.	c. c. or fl. ʒ ij
Syrupus Hypophosphitum Compositus	Dose,	10.	c. c. or fl. ʒ ij
Syrupus Lactucarii	Dose,	10.	c. c. or fl. ʒ ij
Syrupus Rhei	Dose,	10.	c. c. or fl. ʒ ij
Syrupus Rhei Aromaticus	Dose.	10.	c. c. or fl. ʒ ij
Syrupus Sarsaparillæ Compositus	Dose,	10.	c. c. or fl. ʒ ij

To Improve the Taste of Liquid Preparations.

Syrupus (a saturated solution of sugar)	Dose,	5.	c. c. or fl. ʒ j
Syrupus Acaciæ	Dose,	5.	c. c. or fl. ʒ j
Syrupus Acidi Citrici (contains 1% of citric acid)	Dose,	5.	c. c. or fl. ʒ j
Syrupus Aurantii	Dose,	5.	c. c. or fl. ʒ j
Syrupus Calcis	Dose,	5.	c. c. or fl. ʒ j
Syrupus Pruni Virginianæ	Dose,	5.	c. c. or fl. ʒ j
Syrupus Tolutanus	Dose,	5.	c. c. or fl. ʒ j
Syrupus Zingiberis	Dose,	5.	c. c. or fl. ʒ j

Tincturæ (*Tinctures*) are solutions of non-volatile substances in alcohol.

They are made:

1. By maceration.
2. By percolation.
3. By dilution or solution.

Sixty-four *tincturæ* are official.

Poisonous.

Tinctura Cantharidis	Dose,	.25	c. c. or M iv
Tinctura Belladonnæ Foliorum	Dose,	.50	c. c. or M viiss
Tinctura Ferri Chloridi	Dose,	.50	c. c. or M viiss
Tinctura Gelsemii	Dose,	.50	c. c. or M viiss
Tinctura Opii	Dose,	.50	c. c. or M viiss
Tinctura Opii Deodorati	Dose,	.50	c. c. or M viiss
Tinctura Stramonii	Dose,	.50	c. c. or M viiss
Tinctura Strophanthi	Dose,	.50	c. c. or M viiss
Tinctura Aconiti	Dose,	.50	c. c. or M viiss

Tinctura Cannabis Indicæ	Dose,	.50	c. c. or M viiss
Tinctura Nucis Vomicæ	Dose,	.50	c. c. or M viiss
Tinctura Digitalis	Dose,	1.	c. c. or M xv
Tinctura Hyoscyami	Dose,	1.	c. c. or M xv
Tinctura Lobeliæ	Dose,	1.	c. c. or M xv
Tinctura Physostigmatis	Dose,	1.	c. c. or M xv
Tinctura Colchici Seminis	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Opii Camphorata	Dose,	10.	c. c. or fl. ʒ ij

Non-Poisonous.

Tinctura Capsici	Dose,	.50	c. c. or M viiss
Tinctura Asafœtidæ	Dose,	1.	c. c. or M xv
Tinctura Myrrhæ	Dose,	1.	c. c. or M xv
Tinctura Aloes	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Aloes et Myrrhæ	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Benzoini Composita	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Cinnamomi	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Guaiaci Ammoniata	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Lavandulæ Composita	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Quassiæ	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Valerianæ Ammoniata	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Zingiberis	Dose,	2.	c. c. or fl. ʒ ss
Tinctura Calumbæ	Dose,	5.	c. c. or fl. ʒ j
Tinctura Cardamomi	Dose,	5.	c. c. or fl. ʒ j
Tinctura Cardamomi Composita	Dose,	5.	c. c. or fl. ʒ j
Tinctura Cinchonæ	Dose,	5.	c. c. or fl. ʒ j
Tinctura Cinchonæ Composita (Huxham's Tincture)	Dose,	5.	c. c. or fl. ʒ j
Tinctura Gallæ	Dose,	5.	c. c. or fl. ʒ j
Tinctura Gentianæ Composita	Dose,	5.	c. c. or fl. ʒ j
Tinctura Krameriæ	Dose,	5.	c. c. or fl. ʒ j
Tinctura Rhei	Dose,	5.	c. c. or fl. ʒ j
Tinctura Rhei Aromatica	Dose,	5.	c. c. or fl. ʒ j
Tinctura Valerianæ	Dose,	5.	c. c. or fl. ʒ j

Used Externally.

Tinctura Arnicæ.
Tinctura Iodi.

Triturationes (*Triturations*) are solid preparations for internal administration, and, unless otherwise ordered, contain 10 per cent. of the active substance.

They are made by thoroughly rubbing the medicament with sugar of milk.

One *trituratio* is official.

Trituratio Elaterini.....Dose .03 gm. or gr. ss

Trochisci (*Troches*) are medicated lozenges for solution in the mouth.

Nine *trochisci* are official.

Trochisci Acidi Tannici (each contains .06 gm. (gr. 1) of tannic acid).
Trochisci Ammonii Chloridi, (each contains .10 gm. (gr. 1½) of ammonium chloride).
Trochisci Cubebæ (each contains .02 gm. (gr. ⅓) of oleoresin of cubeb).
Trochisci Krameriæ (each contains .06 gm. (gr. 1) of extract of krameria).

Unguenta (*Ointments*) are medicated semi-solid preparations for external use.

They are made with lard or petrolatum.

Twenty-four *unguenta* are official.

Non-Irritating and Soothing.

Unguentum (20% of white wax and 80% of benzoinated lard).
Unguentum Aqua Rosæ (cold cream).
Unguentum Belladonnæ (contains 10% of extract of belladonna leaves).
Unguentum Stramonii (contains 10% of extract of stramonium).
Unguentum Zinci Oxidi (zinc ointment). (contains 20% of zinc oxide).
Unguentum Zinci Stearatis (contains 50% of stearate of zinc).

Irritating and Stimulant.

Unguentum Acidi Tannici (contains 20% of tannic acid).
Unguentum Chrysarobini (contains 6% of chrysarobin).
Unguentum Diachylon (Hebra's Ointment). (contains 50% of lead plaster).
Unguentum Hydrargyri (mercurial ointment), (contains 50% of mercury).
Unguentum Hydrargyri Dilutum (Blue Ointment). (is mercurial ointment diluted one-third with petrolatum).

Unguentum Hydrargyri Ammoniati (contains 10% of ammoniated mercury).
Unguentum Hydrargyri Oxidi Flavi (contains 10% of yellow mercuric oxide).
Unguentum Iodi (contains 4% of iodine).
Unguentum Iodoformi (contains 10% of iodoform).
Unguentum Phenolis (contains 3% of phenol).
Unguentum Picis Liquidæ (contains 50% of tar).
Unguentum Sulphuris (contains 15% of washed sulphur).

Vina (*Wines*) are liquid preparations containing the soluble principles of medicinal substances dissolved in wine, intended for internal administration.

They are made by solution.

Ten *vina* are official.

Poisonous.

Vinum Opii .....Dose, .50 c. c. or M viiss
Vinum Antimonii .....Dose, 1. c. c. or M xv
Vinum Colchici Seminis .....Dose, 2. c. c. or fl. ʒ ss

Non-Poisonous.

Vinum Ipecacuanhæ .....Dose, .50 c. c. or M viiss
Vinum Ergotæ .....Dose, 5. c. c. or fl. ʒ j
Vinum Cocæ .....Dose, 15. c. c. or fl. ʒ iv
Vinum Album (white wine), (should contain from 8½ to 15% absolute alcohol).
Vinum Rubrum (red wine), (should contain from 8½ to 15% absolute alcohol).

LIST OF OFFICIAL DRUGS.

Class 1, Acids.
Class II, Alkaloids.
Class III, Liquid and Semi-Liquid Substances.
Class IV, Animal Substances.
Class V, Solid Vegetable (Galenic) Substances.
Class VI, Unclassified Solids.

CLASS I.—ACIDS.

Arranged according to the size of the dose.

Thirty-two *acida* are official.

Acids in Solid Form.

Acidum Benzoicum	Dose,	.50 gms. or gr. viiss
Acidum Boricum	Dose,	.50 gms. or gr. viiss
Acidum Citricum	Dose,	.50 gms. or gr. viiss
Acidum Salicylicum	Dose,	.50 gms. or gr. viiss
Acidum Tannicum	Dose,	.50 gms. or gr. viiss
Acidum Tartaricum	Dose,	.50 gms. or gr. viiss
Acidum Camphoricum	Dose,	1. gms. or gr. xv
Acidum Gallicum	Dose,	1. gms. or gr. xv

Dilute Liquid Acids for Internal Use.

The following are all of 10 per cent. strength:

Acidum Hypophosphorosum Dilutum	Dose,	.50 c. c. or M viiss
Acidum Hydriodicum Dilutum	Dose,	.50 c. c. or M viiss
Acidum Hydrochloricum Dilutum	Dose,	1. c. c. or M xv
Acidum Hydrobromicum Dilutum	Dose,	1. c. c. or M xv
Acidum Nitricum Dilutum	Dose,	1. c. c. or M xv
Acidum Phosphoricum Dilutum	Dose,	1. c. c. or M xv
Acidum Sulphuricum Dilutum	Dose,	1. c. c. or M xv

The Following Are More or Less Than 10 Per Cent.:

Acidum Hydrocyanicum Dilutum (2%)	Dose,	.10 c. c. or M iss
Acidum Nitrohydrochloricum Dilutum (4% and 18%, respectively)	Dose,	1. c. c. or M xv
Acidum Sulphuricum Aromaticum (20%)	Dose,	1. c. c. or M xv
Acidum Aceticum Dilutum (6%)	Dose,	1. c. c. or M xv

Strong Acids Used Externally or in Making Dilute Acids.

Acidum Aceticum (36%).
Acidum Aceticum Glaciale.
Acidum Hydrochloricum.
Acidum Hypophosphorosum.
Acidum Lacticum.
Acidum Nitricum.
Acidum Nitrohydrochloricum.
Acidum Oleicum.
Acidum Phosphoricum.
Acidum Stearicum.
Acidum Sulphuricum.
Acidum Sulphurosum.
Acidum Trichloraceticum.

CLASS II.—ALKALOIDS.

Twenty-two *alkaloids* are official.

The following are the most used, and are arranged according to the size of the dose:

Aconitina	Dose, .00015	gm. or gr. 1-400
Atropinæ Sulphas	Dose, .0003	gm. or gr. 1-200
Hyoscinæ Hydrobromidum	Dose, .0003	gm. or gr. 1-200
Hyoscyaminæ Hydrobromidum	Dose, .0003	gm. or gr. 1-200
Hyoscyaminæ Sulphas	Dose, .0003	gm. or gr. 1-200
Colchicina	Dose, .0005	gm. or gr. 1-128
Physostigminæ Salicylas	Dose, .001	gm. or gr. 1-60
Physostigminæ Sulphas	Dose, .001	gm. or gr. 1-60
Strychninæ Nitras	Dose, .002	gm. or gr. 1-30
Strychninæ Sulphas	Dose, .002	gm. or gr. 1-30
Apomorphinæ Hydrochloridum	Dose, .006	gm. or gr. 1-10
Pilocarpinæ Hydrochloridum	Dose, .006	gm. or gr. 1-10
Pilocarpinæ Nitras	Dose, .006	gm. or gr. 1-10
Morphinæ Acetas	Dose, .01	gm. or gr. ⅙
Morphinæ Hydrochloridum	Dose, .01	gm. or gr. ⅙
Morphinæ Sulphas	Dose, .01	gm. or gr. ⅙
Sparteinæ Sulphas	Dose, .01	gm. or gr. ⅙
Cocainæ Hydrochloridum	Dose, .03	gm. or gr. ½
Codeinæ Phosphas	Dose, .03	gm. or gr. ½
Codeinæ Sulphas	Dose, .03	gm. or gr. ½
Hydrastininæ Hydrochloridum	Dose, .03	gm. or gr. ½
Caffeina Citrata	Dose, .10	gm. or gr. ij
Cinchonidinæ Sulphas	Dose, .20	gm. or gr. iij
Cinchoninæ Sulphas	Dose, .20	gm. or gr. iij
Quininæ Bisulphas	Dose, .20	gm. or gr. iij
Quininæ Hydrobromidum	Dose, .20	gm. or gr. iij
Quininæ Hydrochloridum	Dose, .20	gm. or gr. iij
Quininæ Salicylas	Dose, .20	gm. or gr. iij
Quininæ Sulphas	Dose, .20	gm. or gr. iij

CLASS III.—LIQUID AND SEMI-SOLID SUBSTANCES.

Arranged Alphabetically.

Adeps.
Adeps Benzoinatus (2% of Benzoin).
Adeps Lanæ.
Adeps Lanæ Hydrosus.

Aether	Dose,	1. c. c. or M x
Aether Aceticus	Dose,	1. c. c. or M x
Aethylis Chloridum.		
Alcohol (92.3% by weight, or 94.9% by volume).		
Alcohol Absolutum (contains no more than 1% by weight of H_2O).		
Alcohol Dilutum (50% water).		
Amylis Nitris	Dose,	.20 c. c. or M iij
Balsamum Peruvianum.		
Balsamum Tolutanum.		
Bromoformum	Dose,	.20 c. c. or M iij
Chloroformum	Dose.	.30 c. c. or M v
Cinnaldehydum	Dose,	.05 c. c. or M j
Copaiba	Dose,	.20 c. c. or M iij
Creosotum	Dose,	.05 c. c. or M j
Cresol (a mixture of the three isomeric cresols).		
Eucalyptol	Dose,	.30 c. c. or M v
Eugenol (an aromatic phenol from cloves)	Dose,	.20 c. c. or M iij
Ferri Hydroxidum cum Magnesii Oxido (arsenic antidote)	Dose,	100. c. c. or fl. ʒ iij
Glycerinum	Dose,	5. c. c. or fl. ʒ j
Guiacol	Dose,	.20 c. c. or M iij
Methylis Salicylas	Dose,	1. c. c. or M xv
Paralydehydum	Dose,	2. c. c. or fl. ʒ ss
Petrolatum.		
Petrolatum Album.		
Petrolatum Liquidum.		
Phenol Liquifactum	Dose.	.05 c. c. or M j
Pix Liquida.		
Safrolum	Dose.	.30 c. c. or M v
Sapo.		
Sapo Mollis.		
Terebenum	Dose.	.50 c. c. or M viiss
Terebinthina Canadensis.		

CLASS IV.—ANIMAL SUBSTANCES.

Arranged Alphabetically.

Fel Bovis Purificatum	Dose.	.30 gm. or gr. v
Gelatinum.		
Gelatinum Glycerinatum.		
Glandulæ Suprarenales Siccæ.	Dose,	.25 gm. or gr. iv

Glandulæ Thyroideæ Siccæ...Dose, .20 gm. or gr. iij
Pancreatinum .....Dose, .50 gm. or gr. viiss
Pepsinum .....Dose, .25 gm. or gr. iv
Serum Antidiphthericum—
Average .....Dose, 3000 units or more
Immunizing ..Dose, 1000 units.

CLASS V.—SOLID VEGETABLE (GALENIC) SUBSTANCES.

Arranged Alphabetically.

Aconitum	Dose,	.05	gm. or gr. j
Aloe	Dose,	.25	gm. or gr. iv
Aloe Purificata	Dose,	.25	gm. or gr. iv
Aloinum	Dose,	.03	gm. or gr. ½
Anisum	Dose,	.50	gm. or gr. viiss
Anthemis	Dose,	2.	gm. or ʒ ss
Apocynum	Dose,	1.	gm. or gr. xv
Arnica.			
Asafœtida	Dose,	.25	gm. or gr. iv
Aspidium.			
Aurantii Amari Cortex.			
Aurantii Dulcis Cortex.			
Belladonna Folia	Dose,	.05	gm. or gr. j
Belladonna Radix	Dose,	.05	gm. or gr. j
Benzoinum	Dose,	1.	gm. or gr. xv
Berberis	Dose,	2.	gm. or ʒ ss
Buchu	Dose,	2.	gm. or ʒ ss
Calamus	Dose,	1.	gm. or gr. xv
Calendula	Dose,	1.	gm. or gr. xv
Calumba	Dose,	2.	gm. or ʒ ss
Cambogia	Dose,	.10	gm. or gr. ij
Cannabis Indica	Dose,	.10	gm. or gr. ij
Cantharis.			
Capsicum	Dose,	.10	gm. or gr. ij
Carbo Ligni	Dose,	.50	gm. or gr. viiss
Cardamomum	Dose,	1.	gm. or gr. xv
Carum	Dose,	1.	gm. or gr. xv
Caryophyllus	Dose,	.25	gm. or gr. iv
Cassia Fistula.			
Chimaphila	Dose,	2.	gm. or ʒ ss
Chirata	Dose,	1.	gm. or gr. xv
Chondrus.			
Chrysarobinum.			
Cimicifuga	Dose,	1.	gm. or gr. xv
Cinchona	Dose,	1.	gm. or gr. xv
Cinchona Rubra	Dose,	1.	gm. or gr. xv
Cinnamomum Saigonicum	Dose,	.25	gm. or gr. iv
Cinnamomum Zelanicum	Dose,	.25	gm. or gr. iv

Coca	Dose,	2.	gm. or ʒ ss
Colchici Cormus	Dose,	.20	gm. or gr. iij
Colchici Semen	Dose,	.20	gm. or gr. iij
Colocynthis	Dose,	.05	gm. or gr. j
Conium	Dose,	.20	gm. or gr. iij
Convallaria	Dose,	.50	gm. or gr. viiss
Coriandrum	Dose,	.50	gm. or gr. viiss
Cubeba	Dose,	1.	gm. or gr. xv
Cusso.			
Cypripedium	Dose,	1.	gm. or gr. xv
Digitalis	Dose,	.05	gm. or gr. j
Elaterinum	Dose,	.005	gm. or gr. 1-12
Ergota.			
Eriodictyon	Dose,	1.	gm. or gr. xv
Eucalyptus.			
Euonymus	Dose,	.50	gm. or gr. viiss
Eupatorium	Dose,	2.	gm. or ʒ ss
Fœniculum	Dose,	1.	gm. or gr. xv
Frangula	Dose,	1.	gm. or gr. xv
Galla	Dose,	.50	gm. or gr. viiss
Gambia	Dose,	1.	gm. or gr. xv
Gelsemium	Dose,	.05	gm. or gr. j
Gentiana	Dose,	1.	gm. or gr. xv
Geranium	Dose,	1.	gm. or gr. xv
Glycyrrhiza	Dose,	2.	gm. or ʒ ss
Gossypii Cortex	Dose,	2.	gm. or ʒ ss
Granatum	Dose,	2.	gm. or ʒ ss
Grindelia	Dose,	2.	gm. or ʒ ss
Guaiacum	Dose,	1.	gm. or gr. xv
Guarana	Dose,	2.	gm. or ʒ ss
Hamamelidis Cortex	Dose,	2.	gm. or ʒ ss
Hamamelidis Folia	Dose,	2.	gm. or ʒ ss
Hedeoma	Dose,	8.	gm. or gr. ʒ ij
Humulus	Dose,	2.	gm. or ʒ ss
Hydrastis	Dose,	2.	gm. or ʒ ss
Hyoscyamus	Dose,	.25	gm. or gr. iv
Ipecacuanha (expectorant)	Dose,	.05	gm. or gr. j
Ipecacuanha (emetic)	Dose,	2.	gm. or ʒ ss
Kino	Dose,	.50	gm. or gr. viiss
Krameria	Dose,	1.	gm. or gr. xv
Lactucarium.			
Lappa	Dose,	2.	gm. or ʒ ss
Leptandra	Dose,	1.	gm. or gr. xv
Lobelia	Dose,	.50	gm. or gr. viiss
Lupulinum	Dose,	.50	gm. or gr. viiss
Maltum.			
Manna	Dose,	15.	gm. or ʒ iv
Marrubium	Dose,	2.	gm. or ʒ ss
Mastiche	Dose,	2.	gm. or ʒ ss
Matico	Dose,	5.	gm. or ʒ j

Matricaria	Dose,	15.	gm. or ℥ iv
Mentha Piperita	Dose,	5.	gm. or ℥ j
Mentha Veridis	Dose,	5.	gm. or ℥ j
Mezereum.			
Moschus	Dose,	.25	gm. or gr. iv
Myristica	Dose,	.50	gm. or gr. viiss
Myrrha	Dose,	.50	gm. or gr. viiss
Nux Vomica	Dose,	.05	gm. or gr. j
Opii Pulvis	Dose,	.05	gm. or gr. j
Opium	Dose,	.10	gm. or gr. iss
Opium Deodoratum	Dose,	.05	gm. or gr. j
Opium Granulatum	Dose,	.05	gm. or gr. j
Pareira	Dose,	2.	gm. or ʒ ss
Pepo	Dose,	30.	gm. or ℥ j
Physostigma.			
Phytolacca	Dose,	.10	gm. or gr. ij
Pilocarpus	Dose,	2.	gm. or ʒ ss
Pimenta	Dose,	1.	gm. or gr. xv
Piper	Dose,	.50	gm. or gr. viiss
Piperina	Dose,	.20	gm. or gr. iij
Podophyllum.			
Prunus Virginiana	Dose,	2.	gm. or ʒ ss
Pyrethrum.			
Quassia	Dose,	.50	gm. or gr. viiss
Quercus	Dose,	1.	gm. or gr. xv
Rhamnus Purshiana (Cascara Sagrada)	Dose,	1.	gm. or gr. xv
Rheum	Dose,	1.	gm. or gr. xv
Rhus Glabra	Dose,	1.	gm. or gr. xv
Rubus	Dose,	1.	gm. or gr. xv
Sabal	Dose,	1.	gm. or gr. xv
Sabina	Dose,	.50	gm. or gr. viiss
Salicinum	Dose,	1.	gm. or gr. xv
Salvia	Dose,	2.	gm. or ʒ ss
Sanguinaria	Dose,	.10	gm. or gr. ij
Santoninum	Dose,	.05	gm. or gr. j
Sarsaparilla	Dose,	2.	gm. or ʒ ss
Sassafras	Dose,	10.	gm. or ʒ iiss
Scammonium.			
Scilla	Dose,	.10	gm. or gr. ij
Scoparius	Dose,	1.	gm. or gr. xv
Scopola	Dose,	.03	gm. or gr. ½
Scutellaria	Dose,	1.	gm. or gr. xv
Senega	Dose,	1.	gm. or gr. xv
Senna	Dose,	5.	gm. or ʒ j
Serpentaria	Dose,	1.	gm. or gr. xv
Sinapis Alba (emetic)	Dose,	10.	gm. or ʒ iiss
Sinapis Nigra.			
Spigelia	Dose,	5.	gm. or ʒ j
Staphisagria	Dose,	.05	gm. or gr. j

Stillingia	Dose,	2.	gm. or 3 ss
Stramonium	Dose,	.05	gm. or gr. j
Strophanthinum	Dose,	.0003	gm. or gr. 1-200
Strophanthus	Dose,	.05	gm. or gr. j
Styrax	Dose,	1.	gm. or gr. xv
Sumbul	Dose.	2.	gm. or 3 ss
Tamarindus	Dose,	15.	gm. or 3 iv
Taraxacum	Dose,	10.	gm. or 3 iiss
Triticum	Dose,	10.	gm. or 3 iiss
Uva Ursi	Dose,	2.	gm. or 3 ss
Valeriana	Dose,	2.	gm. or 3 ss
Vanilla.			
Veratrum	Dose,	.10	gm. or gr. ij
Viburnum Opulus	Dose,	2.	gm. or 3 ss
Viburnum Prunifolium	Dose.	2.	gm. or 3 ss
Xanthoxylum	Dose,	2.	gm. or 3 ss
Zingiber	Dose.	1.	gm. or gr. xv

CLASS VI.—UNCLASSIFIED SOLIDS.

Arranged Alphabetically.

Acetanilidum	Dose,	.20	gm. or gr. iij
Acetphenitidinum (Phenacetine)	Dose,	.50	gm. or gr. viiss
Aethylis Carbamas (Urethane)	Dose,	1.	gm. or gr. xv
Alumen	Dose,	.50	gm. or gr. viiss
Ammonii Benzoas	Dose,	1.	gm. or gr. xv
Ammonii Bromidum	Dose,	1.	gm. or gr. xv
Ammonii Carbonas	Dose.	.25	gm. or gr. iv
Ammonii Chloridum	Dose,	.30	gm. or gr. v
Ammonii Iodidum	Dose.	.25	gm. or gr. iv
Ammonii Salicylas	Dose.	.25	gm. or gr. iv
Ammonii Valeras	Dose.	.50	gm. or gr. viiss
Antimonii et Potassii Tartras, (expectorant)	Dose.	.005	gm. or gr. 1-12
Antipyrina	Dose,	.50	gm. or gr. viiss
Argenti Nitras	Dose.	.01	gm. or gr. 1/6
Argenti Oxidum	Dose.	.065	gm. or gr. j
Arseni Iodidum	Dose.	.005	gm. or gr. 1-12
Arseni Trioxidum	Dose.	.002	gm. or gr. 1-30
Aurii et Sodii Chloridum	Dose.	.005	gm. or gr. 1-12
Benzosulphinidum (Saccharin)	Dose,	.20	gm. or gr. iij
Betanaphthol	Dose,	.25	gm. or gr. iv
Bismuthi Citras	Dose.	.15	gm. or gr. iiss
Bismuthi et Ammonii Citras	Dose.	.15	gm. or gr. iiss
Bismuthi Subcarbonas	Dose,	1.	gm. or gr. xv

Bismuthi Subgallas	Dose,	.50	gm. or gr. viiss
Bismuthi Subnitras	Dose,	1.	gm. or gr. xv
Bismuthi Subsalicylas	Dose,	.25	gm. or gr. iv
Caffeina Citrata Effervescens.	Dose,	4.	gm. or ʒ j
Calcii Bromidum	Dose,	1.	gm. or gr. xv
Calcii Carbonas Præcipitatus.	Dose,	1.	gm. or gr. xv
Calcii Chloridum	Dose,	.50	gm. or gr. viiss
Calcii Hypophosphis	Dose,	.50	gm. or gr. viiss
Calx Chlorinata	Dose,	.25	gm. or gr. iv
Calx Sulphurata	Dose,	.10	gm. or gr. iss
Camphora	Dose,	.15	gm. or gr. iiss
Camphora Monobromata	Dose,	.15	gm. or gr. iiss
Cerii Oxalas	Dose,	.10	gm. or gr. iss
Chloralformamidum (Chloral-amid)	Dose,	1.	gm. or gr. xv
Chloralum Hydratum	Dose,	.50	gm. or gr. viiss
Chromii Trioxidum (Chromic acid).			
Creta Præparata	Dose,	1.	gm. or gr. xv
Cupri Sulphas ... (emetic)	Dose,	.50	gm. or gr. viiss
Ferri Carbonas Saccharatus	Dose,	.20	gm. or gr. iij
Ferri Chloridum	Dose,	.05	gm. or gr. j
Ferri Citras	Dose,	.20	gm. or gr. iij
Ferri et Ammonii Citras	Dose,	.20	gm. or gr. iij
Ferri et Ammonii Sulphas	Dose,	.20	gm. or gr. iij
Ferri et Ammonii Tartras	Dose,	.20	gm. or gr. iij
Ferri et Potassii Tartras	Dose,	.20	gm. or gr. iij
Ferri et Quininæ Citras	Dose,	.20	gm. or gr. iij
Ferri et Quininæ Citras Solubilis	Dose,	.20	gm. or gr. iij
Ferri et Strychninæ Citras	Dose,	.10	gm. or gr. ij
Ferri Hypophosphis	Dose,	.20	gm. or gr. iij
Ferri Phosphas Solubilis	Dose,	.20	gm. or gr. iij
Ferri Pyrophosphas Solubilis.	Dose,	.20	gm. or gr. iij
Ferri Sulphas	Dose,	.20	gm. or gr. iij
Ferri Sulphas Exsiccatus	Dose,	.10	gm. or gr. ij
Ferri Sulphas Granulatus	Dose,	.20	gm. or gr. iij
Ferri Reductum	Dose,	.10	gm. or gr. ij
Glycyrrhizinum Ammoniatum.	Dose,	.25	gm. or gr. iv
Guaiacolis Carbonas	Dose,	1.	gm. or gr. xv
Hexamethylenamina (Urotropin)	Dose,	.50	gm. or gr. viiss
Hydrargyri Chloridum Corrosivum	Dose,	.003	gm. or gr. 1-20
Hydrargyri Chloridum Mite, (alterative)	Dose,	.03	gm. or gr. ½
(purgative)	Dose,	.25	gm. or gr. iv
Hydrargyri Iodidum Flavum.	Dose,	.01	gm. or gr. ⅙
Hydrargyri Iodidum Rubrum.	Dose,	.003	gm. or gr. 1-20

Hydrargyrum cum Creta	Dose,	.25	gm. or gr. iv
Iodoformum.			
Iodolum.			
Iodum.			
Lithii Benzoas	Dose,	1.	gm. or gr. xv
Lithii Bromidum	Dose,	1.	gm. or gr. xv
Lithii Carbonas	Dose,	.30	gm. or gr. v
Lithii Citras	Dose,	.30	gm. or gr. v
Lithii Citras Effervescens	Dose,	8.	gm. or ʒ ij
Lithii Salicylas	Dose,	.50	gm. or gr. viiss
Magnesii Carbonas	Dose,	.50	gm. or gr. viiss
Magnesii Oxidum	Dose,	.50	gm. or gr. viiss
Magnesii Oxidum Ponderosum	Dose,	.50	gm. or gr. viiss
Magnesii Sulphas (Epsom Salts)	Dose,	15.	gm. or ʒ ss
Magnesii Sulphas Effervescens	Dose,	15.	gm. or ʒ ss
Mangani Dioxidum Præcipitatum	Dose,	.20	gm. or gr. iij
Mangani Hypophosphis	Dose,	.20	gm. or gr. iij
Mangani Sulphas	Dose,	.20	gm. or gr. iij
Menthol	Dose,	.05	gm. or gr. j
Methylthioninæ Hydrochloridum (Methylene Blue)	Dose,	.10	gm. or gr. ij
Naphthalenum	Dose,	.10	gm. or gr. ij
Phenol (Carbolic Acid)	Dose,	.05	gm. or gr. j
Phenylis Salicylas (Salol)	Dose,	.30	gm. or gr. v
Phosphorus	Dose,	.0005	gm. or gr. 1-128
Plumbi Acetas	Dose,	.05	gm. or gr. j
Potassii Acetas	Dose,	2.	gm. or ʒ ss
Potassii Bicarbonas	Dose,	2.	gm. or ʒ ss
Potassii Bitartras	Dose,	2.	gm. or ʒ ss
Potassii Bromidum	Dose,	1.	gm. or gr. xv
Potassii Carbonas	Dose,	1.	gm. or gr. xv
Potassii Chloras	Dose,	.10	gm. or gr. ij
Potassii Citras	Dose,	2.	gm. or ʒ ss
Potassii Citras Effervescens	Dose,	4.	gm. or ʒ j
Potassii Cyanidum.			
Potassii Dichromas	Dose,	.01	gm. or gr. 1/6
Potassii et Sodii Tartras (Rochelle Salts)	Dose,	15.	gm. or ʒ ss
Potassii Ferrocyanidum	Dose,	.50	gm. or gr. viiss
Potassii Hypophosphis	Dose,	.50	gm. or gr. viiss
Potassii Iodidum	Dose,	.50	gm. or gr. viiss
Potassii Nitras	Dose,	.50	gm. or gr. viiss
Potassii Permanganas	Dose,	.10	gm. or gr. iss
Potassii Sulphas	Dose,	2.	gm. or ʒ ss
Resorcinol (Resorcin)	Dose,	.10	gm. or gr. iss

Sodii Acetas	Dose,	1.	gm. or gr. xv
Sodii Arsenas	Dose,	.005	gm. or gr. 1-12
Sodii Arsenas Exsiccatus	Dose,	.003	gm. or gr. 1-20
Sodii Benzoas	Dose,	1.	gm. or gr. xv
Sodii Bicarbonas	Dose,	1.	gm. or gr. xv
Sodii Bisulphis	Dose,	.50	gm. or gr. viiss
Sodii Boras	Dose,	.50	gm. or gr. viiss
Sodii Bromidum	Dose,	1.	gm. or gr. xv
Sodii Chloras	Dose,	.25	gm. or gr. iv
Sodii Chloridum.			
Sodii Citras	Dose,	1.	gm. or gr. xv
Sodii Hypophosphis	Dose,	1.	gm. or gr. xv
Sodii Iodidum	Dose,	.50	gm. or gr. viiss
Sodii Nitras	Dose,	1.	gm. or gr. xv
Sodii Nitris	Dose,	.05	gm. or gr. j
Sodii Phenosulphonas	Dose,	.25	gm. or gr. iv
Sodii Phosphas	Dose,	2.	gm. or ʒ ss
Sodii Phosphas Effervescens	Dose,	8.	gm. or gr. ʒ ij
Sodii Phosphas Exsiccatus	Dose,	1.	gm. or gr. xv
Sodii Pyrophosphas	Dose,	2.	gm. or ʒ ss
Sodii Salicylas	Dose,	1.	gm. or gr. xv
Sodii Sulphas (Glauber's Salts)	Dose,	15.	gm. or ʒ ss
Sodii Sulphis	Dose,	1.	gm. or gr. xv
Sodii Thiosulphas (Hyposulphite)	Dose,	1.	gm. or gr. xv
Strontii Bromidum	Dose,	1.	gm. or gr. xv
Strontii Iodidum	Dose,	.50	gm. or gr. viiss
Strontii Salicylas	Dose,	1.	gm. or gr. xv
Sulphonethylmethanum (Trional)	Dose,	1.	gm. or gr. xv
Sulphonmethanum Sulphonal	Dose,	1.	gm. or gr. xv
Sulphur Lotum	Dose,	4.	gm. or ʒ j
Sulphur Precipitatum	Dose,	4.	gm. or ʒ j
Sulphur Sublimatum	Dose,	4.	gm. or ʒ j
Talcum.			
Talcum Purificatum.			
Terpini Hydras	Dose,	.15	gm. or gr. iiss
Thymol	Dose,	.10	gm. or gr. ij
Thymolis Iodidum (Aristol)			
Vanillinum	Dose,	.03	gm. or gr. ss
Zinci Acetas	Dose,	.10	gm. or gr. ij
Zinci Bromidum	Dose,	.10	gm. or gr. ij
Zinci Chloridum.			
Zinci Iodidum	Dose,	.05	gm. or gr. j
Zinci Oxidum	Dose,	.20	gm. or gr. iij
Zinci Phenosulphonas	Dose,	.10	gm. or gr. ij
Zinci Stearas.			
Zinci Sulphas (emetic)	Dose,	2.	gm. or ʒ ss
Zinci Valeras	Dose,	.15	gm. or gr. iiss

TABLE OF THERMOMETRIC EQUIVALENTS.

To convert Degrees Centigrade to Degrees Fahrenheit, multiply by 9, divide by 5, and add 32 to the quotient.

Centigrade.		*Fahrenheit.*	
—25	=	—13	
—20	=	— 4	
—15	=	+ 3	
—10	=	+14	
— 5	=	+23	
0	=	+32	(Freezing point of water.)
5	=	41	
10	=	50	
15	=	59	
20	=	68	
25	=	77	
30	=	86	
35	=	95	
36	=	96.8	
37	=	98.6	(Average normal human temperature.)
37.2	=	99	
37.8	=	100	
38	=	100.4	
38.3	=	101	
38.9	=	102	
39.4	=	103	
40	=	104	
40.5	=	105	
41.1	=	106	
41.6	=	107	
42.2	=	108	
42.8	=	109	
43.3	=	110	
44	=	111.2	
45	=	113	
50	=	122	
60	=	140	
70	=	158	
80	=	176	
90	=	194	
100	=	212	(Boiling point of water.)

CHAPTER III.

TOXICOLOGY.—THE SYMPTOMS AND TREATMENT OF POISONING.

The immediate treatment of poisoning does not vary greatly with drugs of the same class, therefore the drugs which most frequently cause poisoning are arranged alphabetically in classes.

Class I.—Irritants and Corrosives.

Ammonia (Ammonium Hydrate)
Arsenic
Chromium Trioxide (Chromic Acid)
Hydrochloric Acid
Lead Acetate
Mercuric Chloride (Corrosive Sublimate)
Nitric Acid
Oxalic Acid
Phosphorus
Potassium Bichromate
Potassium Hydrate
Sodium Hydrate
Sulphuric Acid

Class II.—Nervous Stimulants.

Aromatic Oils
Atropine (Belladonna)
Camphor
Cocaine
Hyoscyamus
Stramonium
Strychnine (Nux Vomica)
Turpentine

Class III.—Cardiac Depressants.

Acetanilide
Aconite
Antipyrine
Cyanides
Digitalis
Gelsemium
Nicotine (Tobacco)
Phenacetine
Phenol (Carbolic Acid)
Physostigmine (Eserine)
Sulphonal
Trional
Veratrum

Class IV.—Narcotics.

Alcohol
Bromides
Carbon Monoxide (Coal-Gas)
Chloral (Chloral Hydrate)
Methyl Alcohol (Wood Alcohol)
Opium

CLASS I.—IRRITANTS AND CORROSIVES.

Ammonia (Ammonium Hydrate).

Symptoms.—Burning pain in the œsophagus and stomach, usually vomiting, difficulty in swallowing, skin moist and cold, pulse weak and rapid, dyspnœa, convulsions, coma.

If death, in a few hours.

Chemical Antidotes.—Vinegar, lemon juice, olive oil, castor oil.

Treatment.—Wash out the stomach with warm water, or remove its contents by emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two

grams, or a tablespoonful of mustard to a wineglass of water), repeat in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Use morphine hypodermatically for the pain, if necessary. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly and follow with atropine hypodermatically. If stimulation must be kept up use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Be on guard against œdema of the glottis, which may necessitate tracheotomy. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable.

Contra-Indicated.—If there is probability of erosion of the stomach by reason of the poison taken having great concentration, the stomach tube should not be used.

Sequelæ.—Gastritis, stricture of the œsophagus and stomach.

Arsenic.

Symptoms.—Burning pain in the œsophagus and stomach, colicky pains, muscle cramps, thirst, skin moist and cold, headache, vomiting and later purging. Pulse weak and rapid, respiration shallow and rapid, cyanosis, suppression of urine, convulsions, coma.

If death, in a half hour to two weeks, but usually in about ten hours.

Chemical Antidote.—Ferri Hydroxidum Cum Magnesii Oxido (official arsenic antidote) 100 c. c., followed by a tablespoonful of castor oil.

Treatment.—Wash out the stomach with warm water or remove its contents by emetics (apomorphine hydro-

chloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard to a wineglass of water) repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Use morphine hypodermatically for the pain. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly and follow with atropine hypodermatically. If stimulation must be kept up use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable.

Sequela.—Renal inflammation.

Chromium Trioxide (Chromic Acid).

Symptoms.—Burning pain in the mouth, œsophagus and stomach, colicky pains, cramps in the legs, vomiting, collapse.

If death, usually within twenty-four hours.

Chemical Antidotes.—Chalk, lime water, magnesia, magnesium carbonate, *ad libitum*.

Treatment.—Wash out the stomach with warm water or remove its contents by emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard to a wineglass of water) repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Use morphine hypodermatically for the pain. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly and follow with atropine hypodermatically. If

stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable.

Sequelæ.—Gastritis, renal inflammation, jaundice, stricture of the œsophagus and stomach.

Hydrochloric Acid.

Symptoms.—Burning pain in the mouth, œsophagus and stomach, usually followed at once by vomiting and collapse. If death, usually within twenty-four hours from asphyxia, syncope, or perforation of the stomach.

Chemical Antidotes.—Lime water, magnesia *ad libitum*.

Treatment.—Keep up the body temperature with dry heat applications. Use morphine hypodermatically for the pain. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly and follow with atropine hypodermatically. If stimulation must be kept up use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pre re nata* until such time as strychnine may be repeated with safety. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable.

Contra-Indicated.—Stomach tube, emetics, chalk, and the alkaline carbonates.

Sequelæ.—Gastritis, stricture of the œsophagus and stomach.

Lead Acetate.

Symptoms.—Metallic taste, thirst, colicky pains relieved by pressure, vomiting, cramps in the legs. Pulse hard and rapid, face livid, vertigo, stupor, twitching, convulsions, coma.

If death, in a few hours to several days.

Chemical Antidote.—Dilute hydrochloric acid, five c. c. diluted, magnesium sulphate 30 gms., or sodium sulphate 30 gms.

Treatment.—Wash out the stomach with warm water or remove its contents by emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard to a wineglass of water), repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Use morphine and atropine hypodermatically for the pain and vomiting. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable.

Sequela.—Multiple neuritis.

Mercuric Chloride.

(*Bichloride, Corrosive Sublimate, Bichloride of Mercury.*)

Symptoms.—Metallic taste, burning in the mouth, œsophagus and stomach, colicky pains and vomiting. Pulse weak, rapid and irregular, convulsions, coma, collapse.

If death, in a half hour to ten days.

Chemical Antidote.—Raw eggs, and wash out the stomach with warm water. Then give albumin water and again empty the stomach.

Treatment.—Keep up the body temperature with dry heat applications. Use morphine hypodermatically for the pain. Counteract the depression with strychnine hypo-

dermatically. Should there be insufficient response to this give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable.

Sequelæ.—Discolored gums, salivation, multiple neuritis.

Nitric Acid.

Symptoms.—Similar to Hydrochloric Acid.

Treatment.—Same as Hydrochloric Acid.

Oxalic Acid.

Symptoms.—Hot or sour taste, burning in the œsophagus and stomach. Thirst, pain in the abdomen, back and head usually vomiting. Face cyanotic, skin cold, pulse weak. convulsions, coma.

If death, in a few minutes to an hour. It may, however, be delayed until as late as the fourteenth day, since this is a systemic as well as a corrosive poison.

Treatment.—If seen at once, wash out the stomach with lime water. If not seen at once, remove the stomach contents by emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard to a wineglass of water), repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Use morphine hypodermatically for the pain. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with

atropine hypodermatically. If stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable. Castor oil or magnesium sulphate should be given to evacuate the contents of the bowels.

Contra-Indicated.—Alkalies and alkaline carbonates; the stomach tube, if pain and collapse suggest serious erosion.

Sequelæ.—Gastritis, enteritis, stricture of the œsophagus and stomach.

Phosphorus.

Symptoms.—Signs of poisoning may occur within an hour, or not until three or four days after the poison has been taken. Garlicky breath, pain in the stomach and abdomen, vomiting (bloody and with the odor of phosphorus), subnormal temperature, headache, vertigo, delirium, convulsions, coma. After several days of quiescence acute symptoms often redevelop with pain, hemorrhages, jaundice and nephritis. The urine contains leucin and tyrosin.

If death, usually after several days.

Chemical Antidotes.—Wash out the stomach with 1 to 1,000 potassium permanganate solution, or one per cent. copper sulphate solution.

Treatment —Keep up the body temperature with dry heat applications. Soothe the inflammed mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable. A saline cathartic should be given to evacuate the bowels, preferably magnesium sulphate.

Contra-Indicated.—Oils.

Sequelæ.—Gastritis, enteritis, symptoms of acute yellow atrophy of the liver.

Potassium Bichromate.

Symptoms.—Similar to Chromium Trioxide.
Treatment.—Same as Chromium Trioxide.

Potassium Hydrate.

Symptoms.—Similar to Ammonia.
Treatment.—Same as Ammonia.

Sodium Hydrate.

Symptoms.—Similar to Ammonia.
Treatment.—Same as Ammonia.

Sulphuric Acid.

Symptoms.—Similar to Hydrochloric Acid.
Treatment.—Same as Hydrochloric Acid.

CLASS II.—NERVOUS STIMULANTS.

Aromatic Oils.

Symptoms.—Nervous excitement, skin hot and flushed, pulse full and strong. Later the pulse becomes weak and rapid, skin moist and cold, delirium, convulsions, coma. If death, in a few hours.

Treatment.—Wash out the stomach with warm water, or give several glasses of water and then give an emetic (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard to a wineglass of water), repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Control the convulsions with morphine hypodermatically. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly and follow with atropine

hypodermatically. If stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Allay the thirst and soothe the mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water, and starch water are suitable.

Sequelæ.—Renal and gastro-intestinal inflammation.

Atropine (Belladonna).

Symptoms.—Intense thirst, skin dry, face flushed, pupils dilated, pulse and respiration rapid, restlessness, excitement, delirium, convulsions, coma.

If death, in one to ten hours from paralysis of the respiratory center.

Chemiacl Antidote.—Tannic acid one gram.

Treatment.—Wash out the stomach with warm water or remove its contents with emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard to a wineglass of water) repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Employ artificial respiration, if necessary. Counteract the respiratory failure with strychnine hypodermatically. Allay the thirst. Do not allow the urine to accumulate in the bladder; catheterize if it cannot be voided.

Sequela.—Temporary disturbances of vision.

Camphor.

Symptoms.—Similar to Aromatic Oils.

Treatment.—Same as Aromatic Oils.

Cocaine.

Symptoms.—Nervous excitement, dyspnœa, pupils dilated, face cyanotic, extremities cold, pulse weak and rapid,

respiration shallow, delirium, sometimes convulsions, coma.

Death is rare, but if it occurs is usually within a few minutes.

Chemical Antidote.—If taken by the mouth, give tannic acid, one gram, and wash out the stomach with warm water.

Treatment.—Keep up the body temperature with dry heat applications. Employ artificial respiration, if necessary. Control convulsions with chloroform. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly and follow with atropine hypodermatically. If stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety.

Hyoscyamus.

Symptoms.—Similar to Atropine.

Treatment.—Same as Atropine.

Stramonium.

Symptoms.—Similar to Atropine.

Treatment.—Same as Atropine.

Strychnia (Nux Vomica).

Symptoms.—Restlessness and sense of impending death, difficulty in breathing, sudden muscular contractions (all muscles are involved), increasing in severity and duration, opisthotonus. The contractions are *tonic* and induced by the slightest stimulus. The intellect is always clear.

If death, usually within two hours, from asphyxia, during a convulsion or from exhaustion. Recovery is usual if the fourth hour is survived.

Chemical Antidote.—Tannic acid, one gram.

Treatment.—Wash out the stomach with warm water if convulsions have not commenced. If convulsions have commenced, and it seems advisable to empty the stomach it should be done under chloroform. Do not allow the urine to accumulate in the bladder; catherize under chloroform if it cannot be voided. Give chloral by rectum and control the spasms with chloroform inhalations. As soon as possible give a purge to remove what may remain in the alimentary tract.

Contra-Indicated.—All noise, strong light, and any kind of stimulation.

Turpentine.

Symptoms.—Similar to Aromatic Oils.

Treatment.—Same as Aromatic Oils.

CLASS III.—CARDIAC DEPRESSANTS.

Acetanilide.

Symptoms.—Skin moist and cold, pulse weak and rapid, respiration shallow, prostration, subnormal temperature, cyanosis, pupils dilated, convulsions, coma, collapse.

If death, from cardiac paralysis.

Treatment.—Wash out the stomach with warm water. Emetics should not be used unless absolutely necessary. Keep up the body temperature with dry heat applications. Employ artificial respiration, if necessary. Counteract the depression with strychnine and atropine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly. If stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c. intramuscularly. If stimulation must be kept up, use a satbe repeated with safety. Strong, hot coffee is good treatment. Absolute quiet is essential.

Contra-Indicated.—Any physical exertion.

Sequelæ.—Hæmaglobinuria, jaundice.

Aconite.

Symptoms.—Signs of poisoning may come on with great rapidity. Tingling in the mouth and throat, tingling and numbness in the extremities, burning in the stomach and abdomen, prostration, pupils dilated, skin moist and cold, pulse weak and irregular, respiration shallow and slow. There is deafness and diminished vision. The intellect usually remains clear, but occasionally there is delirium and convulsions. Vomiting is not common.

If death, in a few minutes to three or four hours from cardiac and respiratory paralysis.

Chemical Antidote.—Tannic acid, one gram.

Treatment.—Wash out the stomach with warm water. Keep up the body temperature with dry heat applications. Employ artificial respiration, if necessary. Counteract the depression with strychnine hypodermatically. Should there be insufficent response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up, use caffeine hypodermatically. Morphine may be used hypodermatically to control pain. Strong, hot coffee is good treatment. Absolute quiet is essential. Digitalis should be given later.

Contra-Indicated.—Any exertion, depressant emetics.

Antipyrine.

Symptoms.—Similar to Acetanilide.

Treatment.—Same as Acetanilide.

Cyanides.

Symptoms.—Similar to Hydrocyanic Acid.

Treatment.—Same as Hydrocyanic Acid.

Digitalis.

Symptoms.—Nausea, vomiting, prostration, headache, and usually pain in the back and legs, exophthalmos, dis

turbed vision, dizziness. The pulse is weak, but the heart action is forcible, slow and irregular. Later there is delirium cordis. The intellect usually remains clear, but convulsions and coma may occur.

If death, from cardiac paralysis.

Chemical Antidote.—Tannic acid, one gram.

Treatment.—Wash out the stomach with warm water or remove its contents by emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate, two grams, or a tablespoonful of mustard to a wineglass of water), repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Employ artificial respiration, if necessary. Give brandy or whiskey by mouth, and magnesium sulphate, or some other saline cathartic, to evacuate the bowels.

Contra-Indicated.—Any exertion.

Gelsemium.

Symptoms.—Similar to Aconite.

Treatment.—Same as Aconite.

Hydrocyanic Acid.

Symptoms.—The signs of poisoning are immediate. Exophthalmos, pupils dilated, dyspnœa, pulse weak and irregular. Rapidly following, are loss of consciousness, convulsions, paralysis, involuntary urination and defecation, cyanosis, asphyxia. The odor of almond oil is present.

If death, in a few moments from cardiac and respiratory paralysis.

Treatment.—Wash out the stomach with warm water. Keep up the body temperature with dry heat applications. Give inhalations of ammonia, and counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give adrenalin or suprarenalin solution (1 to 1,000) one c. c. intramuscularly. This may be repeated in fifteen minutes, if necessary. Absolute quiet is essential. Recovery is practically assured if the first half hour is survived.

Contra-Indicated.—Any exertion.

Nicotine (Tobacco).

Symptoms.—Similar to Aconite.
Treament.—Same as Aconite.

Phenacetine.

Symptoms.—Similar to Acetanilide.
Treatment.—Same as Acetanilide.

Phenol (Carbolic Acid).

Symptoms.—The mucous membranes are white from contact with the phenol. Usually, but not always, there is intense burning pain from mouth to stomach. Occasionally there is vomiting. Pupils contracted, temperature subnormal, cyanosis, occasionally convulsions, coma.

If death, in a few minutes to an hour, from cardiac and respiratory paralysis.

Chemical Antidote.—Sodium sulphate, thirty grams, brandy, whiskey, dilute alcohol.

Treatment.—Wash out the stomach with alcohol and water (25 per cent. alcohol). Keep up the body temperature with dry heat applications. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Soothe the inflammed mucous membranes by the unrestricted use of any demulcent liquid that may be desired. Milk, albumin water and starch water are suitable.

Contra-Indicated—Any exertion, oils, emetics.

Sequelæ.—Gastritis, renal inflammation, stricture of the œsophagus and stomach.

Physostigmine (Eserine).

Symptoms.—Vomiting, prostration, pupils contracted, pulse weak and slow, respiration shallow and slow.

If death, from paralysis of the respiratory center.

Chemical Antidote.—Tannic acid, one gram. Strychnine is the physiologic antidote.

Treatment.—Wash out the stomach with warm water. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up, use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Employ artificial respiration, if necessary. Do not allow the urine to accumulate in the bladder; catheterize if it cannot be voided.

Contra-Indicated.—Any exertion.

Sulphonal.

Symptoms.—Similar to Acetanilide.

Treatment.—Same as Acetanilide.

Trional.

Symptoms.—Similar to Acetanilide.

Treatment.—Same as Acetanilide.

Veratrum.

Symptoms.—Burning pain in the mouth, œsophagus and stomach, nausea and vomiting, colicky pains and purging. Pupils dilated, pulse weak and slow, respiration labored and slow, profuse perspiration, sometimes convulsions, coma.

Death is not common, but if occurring, is in a few hours, from cardiac or respiratory paralysis.

Treatment.—Same as Aconite.

CLASS IV.—NARCOTICS.

Alcohol.

Symptoms.—Muscular relaxation, pupils dilated, pulse weak and rapid, temperature subnormal, hallucinations, stupor, respiration stertorous, coma.

If death, from cardiac or respiratory paralysis.

Treatment.—Wash out the stomach with warm water or remove its contents with emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard in a wineglass of water), repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Do not allow the urine to accumulate in the bladder; catheterize if it cannot be voided.

Bromides.

Symptoms.—Similar to Chloral.

Treatment.—Same as Chloral.

Carbon Monoxide (Coal-Gas Poisoning).

Symptoms.—Face livid, pupils dilated, dizziness, weakness, nausea, vomiting, convulsions, coma.

If death, in a few hours to several days.

Treatment.—Keep up the body temperature with dry heat applications. Employ artificial respiration, and if possible, give oxygen inhalations. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin

or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. If the pulse is very weak physiologic saline solution should be infused in every unconscious case. If the pulse is strong enough to warrant it, from 400 c. c. to 600 c. c. of blood should be withdrawn prior to transfusion.

Sequelæ. —Mental weakness, dullness, confusion, loss of memory, weakness, and even temporary paralysis of the extremities, bronchitis, broncho-pneumonia, lobar pneumonia. Occasionally symptoms develop which are referable to lesions in the brain and cord.

Chloral (Chloral Hydrate).

Symptoms. —Prostration, pupils dilated, pulse slow at first, but later weak and rapid, respiration slow, temperature subnormal, coma.

If death, from paralysis of the respiratory center.

Treatment.—Wash out the stomach with warm water, or remove its contents with emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zince sulphate two grams, or a tablespoonful of mustard to a wineglass of water), repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Employ artificial respiration, if necessary.

Methyl Alcohol (Wood Alcohol).

Symptoms.—Similar to Alcohol.
Treatment.—Same as Alcohol.
Sequela—Amblyopia.

Opium (Morphine, Codeine, Etc).

Symptoms.—Drowsiness and decreased sensibility. Pupils contracted, pulse weak and rapid, respiration slow and irregular, ultimately becoming very slow. Skin moist and cold, coma.

If death, from paralysis of the respiratory center.

Chemical Antidote.—Tannic acid, one gram.

Treatment.—Wash out the stomach with warm water, or remove its contents with emetics (apomorphine hydrochloride gr. 1-10 hypodermatically, zinc sulphate two grams, or a tablespoonful of mustard to a wineglass of water), repeated in fifteen minutes, if necessary. Keep up the body temperature with dry heat applications. Counteract the depression with strychnine hypodermatically. Should there be insufficient response to this, give one c. c. of adrenalin or suprarenalin solution (1 to 1,000) intramuscularly, and follow with atropine hypodermatically. If stimulation must be kept up use a saturated solution of camphor in olive oil, one c. c., intramuscularly *pro re nata* until such time as strychnine may be repeated with safety. Employ artificial respiration *persistently.* Do not allow the urine to accumulate in the bladder; catheterize if it cannot be voided. Wash out the stomach once or twice more, at intervals of an hour, and give a saline cathartic to remove the contents of the bowels.

DROWNING.

Raise the body, with the back upwards, so that the head is considerably below the chest level (this position is best attained by laying the body on its abdomen over a barrel). This allows the water to run out of the lungs. Another method is to hold the body up by its feet and attempt to get the water not only out of the lungs, but out of the stomach, if any has been swallowed, as is probable. Then lay the body on its back, cleanse the nose and mouth of mucus with the fingers and a handkerchief, loosen the clothing, and immediately begin, if there is no breathing, artificial respiration. To be sure that the glottis is open it is well to place the neck on a small roll of blanket, or other substance, with the head dropping over back, which will extend the neck. The tongue should be caught with tongue forceps and brought forward, and if it tends to fall back should be held by an assistant, or even a thread could be passed through it to retain it in position.

There are several methods of doing artificial respiration, the best known of which are the Sylvester method, and the Marshall Hall method, the former being the better.

The Sylvester method is done by bringing the arms, fully extended, upwards and backwards over the head until they meet, grasping the forearms near the elbows, the operator standing or sitting back of the patient. The arms are then brought downwards, folded at the elbows, and pressed firmly upon the sides and front of the chest, the elbows meeting in the upper part of the abdomen. An assistant can, at the time of compression of the chest by the arms, press with his hands upon the abdomen, thus causing upward movement of the diaphragm at the time of the artificial expiration. The rate of this artificial respiration should be about fifteen times a minute.

This operation should be occasionally stopped to ascer-

tain if the patient will voluntarily make the attempt at respiration, and if the heart is still beating. If attempts at respiration are made, the rhythmical pulling forward of the tongue, about fifteen times a minute, seems to cause respiratory stimulation. If the patient attempts to breathe and he is to be helped with artificial aid, be sure to follow the rhythm of his attempts, and not compress the chest when he is about to inspire.

While artificial respiration is being done, assistants should rub the legs and feet to aid circulation and to keep the extremities warm, and the physician in attendance should give hypodermics of strychnia, whiskey or brandy, camphor, or nitroglycerine, or all, as his judgment decides.

As soon as respiration is established the body should be surrounded by dry heat, and hot coffee should be given. The subsequent treatment and rest depend upon the condition of the patient.

Positive signs of death are absolute cessation of respiration, as shown by a polished, cold mirror held over the mouth and nostrils showing no befogging. Also, the absence of heart-beat as decided by the ear over the bared chest. Still, even with death apparent, artificial respiration should be done for a short time, as the heart may have but just ceased to beat.

To further decide that circulation has positively ceased, a string may be tied about the finger and if circulation is at all taking place the end of the finger will become dark red and slightly swollen. Also a drop of 1 per cent. atropine sulphate solution placed in an eye should dilate the pupil in a few minutes if there is still life.

CHAPTER IV.

PRESCRIPTION WRITING.

All prescriptions should be written on printed blanks bearing the name, address, office hours and telephone number of the physician. It is best to have a stub for a copy and memorandum of each prescription written, or a tracing sheet may be used. It is not good form to have a pharmacy address on the prescription blank. The date had best be written at the bottom of the prescription, though it is not essential as the druggist's stamp is sufficient. The patient's name should be written on the prescription if more than one patient is prescribed for in the same family, otherwise it is not necessary.

The question of ownership of the prescription is still discussed, but there is no doubt that the prescription belongs to the druggist who compounds it, though he often yields to the desire of the patient to retain it.

The following is a suggestion for a prescription blank, ruled for the metric system:

℞

NAME

AGE

ADDRESS

DATE

_____, M. D.

____ Street Office Hours ____ ____ City ____ State

Weigh Solids. Measure Liquids. C. C.

℞ Grm.

The symbol "℞," heading every prescription, is the beginning of the Latin word *recipe,* which is the imperative mood of the verb *recipio,* and is an order to the compounder signifying "take." The oblique dash over the tail of the "℞" is symbolical of early times when an invocation to Jupiter, later contracted to the simple zodiacal sign, headed every prescription.

The names of the ingredients and the directions to the compounder are always written in Latin, but the directions to the patient should be in English.

When there are several ingredients, the most active solids should generally be placed first, then other active ingredients, and last the vehicle or solvent, perhaps preceded by a flavoring agent.

If there is more than one ingredient they should be followed by the imperative *Misce* (mix), and if powders, pills, or capsules are to be made the imperative *Fac* (make) should be added after the conjunction *et.* (Some writers prefer *Fiat* or *Fiant* (let be made) instead of *Fac.* The noun following these words should then be in the nominative case.) Some physicians prefer to use the imperative *Divide* (divide). This should be followed by the preposition *in* with the accusative. Lastly comes the imperative *Signa* (mark or write), followed by the directions to the patient.

INCOMPATIBILITY.

In writing a prescription care should be taken not to order drugs or preparations which are incompatible.

Drugs may be incompatible *therapeutically, chemically,* and *pharmaceutically.*

Therapeutic Incompatibility occurs when drugs are combined which have antagnostic physiologic actions.

Chemical Incompatibility occurs when from the combination of two or more drugs a new and undesired chemical compound results.

Pharmaceutical Incompatibility occurs when drugs are combined which form, either immediately or later, cloudy, precipitated or decomposed solutions.

There is no excuse for an educated physician to perpetrate a therapeutic incompatibility either in a prescription or in a patient. But it is not therapeutic incompatibility to modify a too decided action of a drug with one that corrects an undesired effect. This is a part of therapeutic science.

Chemical and pharmaceutical incompatibility are so closely related as to be governed many times by the same rule. Such incompatibility is difficult to avoid, and emphasizes the advisability of adopting simplicity in prescription writing, which is really a therapeutic gain.

The following alphabetical list of drugs comprises those that should generally be given alone, especially in solutions. The chemical reasons are appended:

Acids, unless very dilute and in small amount, should be prescribed alone. They combine with bases to form salts, and are incompatible with oxides, alkalies, alkaline salts, hydrates and carbonates. They all precipitate albumin.

Alkalies and Alkaline Carbonates should rarely be prescribed in solution with other drugs. They form salts with acids and precipitate many metallic and alkaloidal salts.

Alkaloidal Salts should rarely be combined with other drugs in solutions. They are precipitated by alkalies, alkaline carbonates, earthly carbonates, preparations containing tannic acid, and by iodides in solution.

Antimony and Potassium Tartrate (Tartar Emetic) should be prescribed in solutions alone. It is incompatible with acids, alkalies, tannic acid, and preparations containing tannic acid.

Arsenic (Arseni Trioxidum, Arsenious Acid) should generally be prescribed in solutions alone.

It is precipitated by salts of iron, magnesia, and solutions of lime.

Bromides in solution should not be combined with alkaloids. They precipitate the salts of morphine, quinine, and strychnine from neutral solutions.

Ferric and Ferrous Salts should generally be prescribed alone. They are incompatible with tannic acid and all drugs containing it; with alkaline carbonates, ammonia, and acacia.

Iodides should generally be prescribed alone.

They are incompatible with salts of alkaloids and metals and with mineral acids.

Mercuric Chloride (Calomel), though insoluble, had ally be prescribed alone. It is incompatible with many drugs.

Mercurous Chloride (Calomel) though insoluble, had best not be prescribed in mixtures. In solutions containing chlorides it may be converted into the mercuric salt.

Resins, including oleoresins, and fluid extracts and tinctures containing resins, should not be prescribed in watery solutions, though they may be ordered in emulsion by suspending them with the mucilage of acacia or tragacanth.

They are all precipitated by water.

Silver Nitrate solutions and solutions of all silver salts must be ordered alone, and kept in dark bottles. If silver salts are prescribed for internal administration they must be alone or combined with some earth, and given in capsules.

Strophanthus in the form of the tincture should not be prescribed in solutions containing water.

It slowly forms a toxic substance, when in watery solution.

Spirits (Spiritus) should mostly not be prescribed with watery preparations, except sweet spirits of nitre, whiskey and brandy. They became cloudy upon the addition of water.

Tannic Acid, and all drugs containing tannic acid, should not be prescribed with most drugs. They are incompatible with alkaloids, salts of iron, lead, silver and antimony.

LATIN.

In the Latin of a prescription the following rules govern the case:

1. The noun expressing the name of the medicine takes the genitive when the quantity to be used is stated.

2. The noun expressing the name of the medicine takes the accusative when the number of pills or troches, etc., *already prepared,* is stated.

3. The quantity of the drug used, if written in Latin instead of figures, would be in the accusative governed by the imperative verb *recipe.*

4. Adjectives agree with their nouns in gender, number and case.

The Declension of Pharmacopœial Latin Nouns.

First Declension.—Nouns ending in *a* belong to the first declension, are feminine, and have their genitives in *æ.*

The *exceptions* to this rule are:

Nominative	*Genitive*	
Enema	Enematis	Third declension, neuter gender
Physostigma	Physostigmatis	
Aspidosperma	Aspidospermatis	
Folia (pleural)	Foliorum	Second declension, neuter gender

Second Declension.—Nouns ending in *er, ir, us,* and *os* are masculine and have their genitives in *i.*

Nouns ending in *um,* and one in *on* (Hæmatoxylon), are neuter and have their genitives in *i.*

The *exceptions* to this rule are:

Nominative	*Genitive*	
Aether	Aetheris	Third declension, masculine
Bos	Bovis	
Flos	Floris	
Rhus	Rhois	
Quercus	Quercus	Fourth declension, feminine
Spiritus	Spiritus	Fourth declension, masculine

Third Declension.—A large number of pharmacopœial nouns belong to this declension, and may be masculine, feminine, or neuter in gender. They have quite dissimilar endings, and the genitives depend upon these endings, consequently it is difficult to formulate rules. Therefore the drugs of this declension are arranged alphabetically with their genitives and genders following them.

Nominative	*Genitive*	*Gender*
Acetas	Acetatis	m
Adeps	Adipis	m
Aether	Aetheris	m
Aethyl	Aethylis	n
Alcohol	Alcoholis	n
Alumen	Aluminis	n
Amyl	Amylis	n
Anthemis	Anthemidis	f
Arsenas	Arsenatis	m
Arsenis	Arsenitis	m
Asclepias	Asclepiadis	f
Aspidosperma	Aspidospermatis	n
Benzoas	Benzoatis	m
Berberis	Berberidis	f
Betanaphthol	Betanaphtholis	n
Boras	Boratis	m
Bos	Bovis	m
Calx	Calcis	f
Cannabis	Cannabis	f
Cantharis	Cantharidis	f
Carbamas	Carbamatis	m
Carbo	Carbonis	m
Carbonas	Carbonatis	m
Chloras	Chloratis	m
Chromas	Chromatis	m
Citras	Citratis	m
Colocynthis	Colocynthidis	f
Confectio	Confectionis	f

Nominative	*Genitive*	*Gender*
Cortex	Corticis	m
Cresol	Cresolis	n
Digitalis	Digitalis	f
Elixir	Elixiris	n
Enema	Enematis	n
Erigeron	Erigerontis	m
Eucalyptol	Eucalyptolis	n
Eugenol	Eugenolis	n
Fel	Fellis	n
Flos	Floris	m
Gallas	Gallatis	m
Glyceryl	Glycerylis	n
Guaiacol	Guaiacolis	n
Hamamelis	Hamamelidis	f
Hydrastis	Hydrastis	f
Lactas	Lactatis	m
Limo	Limonis	m
Liquor	Liquoris	m
Mel	Mellis	n
Menthol	Mentholis	n
Methyl	Methylis	n
Mucilago	Mucilaginis	f
Nitras	Nitratis	m
Nitris	Nitritis	m
Nux	Nucis	f
Oxalas	Oxalatis	m
Pepo	Peponis	m
Permanganas	Permanganatis	m
Phenol	Phenolis	n
Phenyl	Phenylis	n
Phosphas	Phosphatis	m
Phosphis	Phosphitis	m
Physostigma	Physostigmatis	n
Piper	Piperis	n
Pix	Picis	f
Pulvis	Pulveris	m
Pyrogallol	Pyrogallolis	n
Radix	Radicis	f
Resorcinol	Resorcinolis	n
Rhus	Rhois	m
Salicylas	Salicylatis	m
Sapo	Saponis	m
Semen	Seminis	n
Sinapis	Sinapis	f
Stearas	Stearatis	m
Styrax	Styracis	m
Sulphas	Sulphatis	m
Sulphis	Sulphitis	m
Sulphur	Sulphuris	n

Nominative	*Genitive*	*Gender*
Tannas	Tannatis	m
Tartras	Tartratis	m
Theobroma	Theobromatis	f
Thymol	Thymolis	n
Trituratio	Triturationis	f
Valeras	Valeratis	m
Zingiber	Zingiberis	n

Fourth Declension.—The following nouns ending in *us* have their genitives in *us:*

Nominative	*Genitive*	*Gender*
Quercus	Quercus	f
Spiritus	Spiritus	m

GREEK NOUNS.

The following two Greek nouns are feminine, and simulate the first declension:

Nominative	*Genitive*
Aloe	Aloes
Mastiche	Mastiches

INDECLINABLE NOUNS.

Buchu	Kino
Cajuputi	Matico
Cusso	Sabal
Diachylon	Sassafras
Gambir	Sumbul
Jaborandi	

LATIN VERBS.

The Latin verbs used are best placed in the imperative mood. The most frequently used are:

Adde (add)	Misce (mix)
Divide (divide)	Recipe (take)
Fac (make)	Signa (write)
Filtra (filter)	Solve (dissolve)

These, of course, take their objects in the accusative case, but after *divide, in* (into) with the accusative should be written. *Fiat* (let be made (singular)), and *Fiant* (let be made (plural)), subjunctives, are occasionally used in

place of *Fac.* These verbs should be followed by the nominative.

PREPOSITIONS.

Ana (Greek)--of each.	Should be followed by the genitive.
Ad—to, up to. In—into. Supra—upon. Ante—before Post—after.	Should be followed by the accusative.
Cum—with. Pro—for. Sine—without.	Should be followed by the ablative.

ABBREVIATIONS USED IN PRESCRIPTION WRITING.

Abbreviation	*Latin Name*	*Genitives, Etc.*	*Translation*
aa	Ana (Greek)	Preposition (takes genitive)	Of each
A. c.	Ante cibos		Before meals
ad	Ad	Preposition (takes accusative)	Up to
Adde	Adde	Verb (imperative)	Add
Ad lib.	Ad libitum		To the desired amount
Aq.	Aqua	Aquæ	Water
Aq. dest.	Aqua destillata	Aquæ destillatæ	Distilled water
B. i. d.	Bis in die		Twice a day
Cap.	Capsula	Capsulæ	A capsule
Charta	Charta	Chartæ	A paper
Chart.	Chartula	Chartulæ	A small paper
Cib.	Cibus	Cibi	Food
Co. or Comp.	Compositus	Participle	Compound
C.	Conguis	Congii	Gallon
Conf.	Confectio	Confectionis	A confection
Cort.	Cortex	Corticis	The bark
Decoc.	Decoctum	Decocti	A decoction
Dil.	Dilutus	Adjective	Diluted
Div.	Divide	Verb (imperative)	Divide
Emp.	Emplastrum	Emplastri	A plaster
Ext.	Extractum	Extracti	An extract
F.	Fac	Verb (imperative)	Make
Ft.	Fiat or Fiant	Verb (subjunctive passive)	Let it (or them) be made
Fl.	Fluidus	Adjective	Fluid
Flex.	Flexibilis	Adjective	Flexible (elastic)
Flext.	Fluidextractum	Fluidextracti	A fluid extract

Abbreviation	*Latin Name*	*Genitives, Etc.*	*Translation*
Glyc.	Glyceritum	Glyceriti	A glycerite
Gm.	Gramma	Grammæ	A gram
Gr.	Granum	Grani	A grain
Gtt.	Gutta (or Guttæ)	Guttæ	Drop or drops
H.	Hora	Horæ	An hour
Ind.	Indies	Adverb	Daily
Inf.	Infusum	Infusi	An infusion
Lac	Lac	Lactis	Milk
Lb.	Libra	Libræ	A pound (Troy)
Liq.	Liquor	Liquoris	A solution
Massa	Massa	Massæ	A pill mass
M.	Misce	Verb (imperative)	Mix
Mist.	Mistura	Misturæ	A mixture
Mucil.	Mucilago	Mucilaginis	A mucilage
No. or in no.	In numero		In number
Non repetat.	Non repetatur	Verb	Let it not be repeated.
O.	Octarius	Octarii	A pint
Ovum	Ovum	Ovi	An egg
Pastil.	Pastillus	Pastilli	A pastile (tablet)
P. c.	Post cibos		After meals
Pil.	Pilula	Pilulæ	A pill
P. r. n.	Pro re nata		When required
Pulv.	Pulvis	Pulveris	A powder
Q. h.	Quæquæ hora		Every hour
Q. s.	Quantum sufficit	(Governs the genitive)	A sufficient quantity.
℞.	Recipe	Verb (imperative)	Take
Sat.	Saturatus	Participle	Saturated
Ss.	Semis	Semissis	A half
S. or Sig.	Signa	Verb (imperative)	Mark
Sine	Sine	Preposition	Without
Solv.	Solve	Verb (imperative)	Dissolve
Sol.	Solutio	Solutionis	A solution
Spts.	Spiritus	Spiritus	A spirit
Suppos.	Suppositorium	Suppositorii	A suppository
Syr.	Syrupus	Syrupi	A syrup
Tablet	Tableta	Tabletæ	A tablet
T. i. d.	Ter in die		Three times a day
Tr. or Tinct.	Tinctura	Tincturæ	A tincture
Troch.	Trochiscus	Trochisci	A troche
Trit.	Trituratio	Triturationis	A triurate
Ung.	Unguentum	Unguenti	An ointment
Vin.	Vinum	Vini	A wine
Vitel.	Vitellus	Vitelli	A yolk

WEIGHTS AND MEASURES USED IN COMPOUNDING PRESCRIPTIONS.

The United States Pharmacopœia has wisely adopted the French Metric or Decimal system of weights and measures. Consequently this system is given precedence in this book.

The Decimal system is far superior to the old Troy weights and wine measures, both in simplicity and in offering less opportunity for error. In order to acquire the advantages of the simplicity of the Metric scale one has but to consider grams, centigrams and milligrams, as respectively dollars, cents and mills; cubic centimeters as dollars, and fractions of a cubic centimeter as fractions of a dollar.

It is absurd to accurately translate or transpose the old system into the new, or the reverse, as the range of dose of every drug named in the Pharmacopœia is far wider than the minute difference caused by transposing a given dose in one system to an *approximate* dose in the other. The ridiculous fractions produced by absolute equivalence are chemically correct, but pharmacally and therapeutically unseemly. Hence the student should learn one system by itself and compute in *it*, and not in terms of the other. If translation is necessary, it should be free and not literal, i. e., an approximate equivalence.

In the United States solid drugs and preparations are weighed and liquid drugs and preparations are measured when written in the Metric scale, as well as when written in the old scale.

The New System.

The base of this system is the METER, an established length, representing one-forty millionth part of the earth's circumference around the poles, and equivalent to 39.-370432 inches.

The unit of volume is the LITER, a cube having the length of its side equal to 1-10 of a meter, and equivalent to 2.056716 pints.

The unit of weight is the GRAMME, the weight of a cube of water at 4° C. having the length of its side equal to 1-100 of a meter, and equivalent to 15.432 grains.

For convenience of expression a smaller unit of volume and a larger unit of weight are used, namely, the *cubic centimeter* (1-1,000 of a liter, that is a cube having for its side 1-100 of a meter) and the *kilogram* (1,000 grammes), about 2 1-5 pounds. Microscopists make use of a still smaller unit of length, namely the Mikron (abbreviated by the Greek letter μ) or micro-millimeter, a thousandth part of a millimeter, equal to about 1-25000 of an inch.

The steps in the tables are all by a factor of 10. Those below the unit are expressed by their Latin, and those above by their Greek names, viz.:

Table of Lengths.

10 Millimeters	=	1 Centimeter.
10 Centimeters	=	1 Decimeter.
10 Decimeters	=	1 METER.
10 Meters	=	1 Dekameter.
10 Dekameters	=	1 Hectometer.
10 Hectometers	=	1 Kilometer.

Table of Capacity.

10 Millilitres	=	1 Centilitre.
10 Centilitres	=	1 Decilitre.
10 Decilitres	=	1 LITRE.
10 Litres	=	1 Dekalitre.
10 Dekalitres	=	1 Hectolitre.
10 Hectolitres	=	1 Kilolitre.

The Millilitre is more frequently expressed by its volumetric equivalent, the cubic centimeter and abbreviated to *c. c.*, and the Litre is almost as frequently expressed by 1,000 c. c.

Table of Weights.

10 Milligrams	=	1 Centigram.
10 Centigrams	=	1 Decigram.
10 Decigrams	=	1 GRAMME.
10 Grammes	=	1 Dekagramme.
10 Dekagrammes	=	1 Hectogramme.
10 Hectogrammes	=	1 Kilogram (Kilo).

In prescriptions grammes and fractions of a gramme are used in weighing solids, and cubic centimeters in measuring liquids.

gm.

A gramme is written 1. gm. or 1. and read one gram.
A decigramme is written .1 gm. or .10 and read, best, ten centigrams.
A centigramme is written .01 gm or .01 and read one centigram.
A milligramme is written .001 gm. or .001 and is read one milligram.

c. c.

A cubic centimeter is written 1. c. c. or 1. and read one cubic centimeter.

The Old System.

Troy or Apothecaries' Table.

1 pound (lb. i)	=	12 ounces (℥ xii)	=	1 ounce (Uncia).
1 ounce (℥i)	=	8 drachms (ʒviii)	=	1 pound (Libra).
1 drachm (ʒi)	=	60 grains (gr. lx)	=	1 drachm (Drachma).

Wine or Apothecaries' Measure.

1 pint (Oi)	=	16 fluid ounces (fl. ℥ xvi) = 1 pint (Octarius).
1 fluid ounce (fl. ℥ i)	=	8 fluid drachms (fl. ʒ viii) = 1 fluid ounce (Fluiduncia).
1 fluid drachm (fl. ʒ i)	=	60 minims (M lx) = 1 fluid drachm (Fluiddrachma).

Table of the Approximate Equivalents of the Two Systems.

		gm c. c.	
1 grain (gr. i)	= approximately	.065	= 65 milligrammes = 1 grain.
1 minim (M i)	= approximately	.065	= $\frac{65}{1000}$ of a cubic centimetre = 1 minim.
15 grains (gr.xv)	= approximately	1.	= 1 gramme = 15 grains.

	gm. c. c.	
15 minims (M xv) = approximately	1.	= 1 cubic centimetre = 15 minims.
1 drachm (ʒ i) = approximately	4.	= 4 grammes = 1 drachm.
1 fluid drachm (fl. ʒ i) = approximately,	4.	= 4 cubic centimeters = 1 fluid drachm.
1 ounce (℥ i) = approximately	30.	= 30 grammes = 1 ounce.
1 fluid ounce (fl. ℥ i) = approximately,	30.	= 30 cubic centimeters = 1 fluid ounce.

1 quart = approximately 1000. c. c., or one litre.
1 pint = approximately 500. c. c.
1 teaspoonful = approximately 5. c. c.

THE EVOLUTION OF A PRESCRIPTION.

IN THE NEW SYSTEM.

Weigh solids; measure liquids.

1.

	Gm. C. C.
Take	
Of salt	1.
Of water	5.

Mix

Sign.—One teaspoonful at once.

2.

Same Latinized.

	Gm. C. C.
Recipe	
Sodii chloridi	1.
Aquæ	5.

Misce

Signa.—One teaspoonful at once.

3.

Same abbreviated.

	Gm. C. C.
℞	
Sodii chloridi	1.
Aquæ	5.

M.

Sig.—One teaspoonful at once.

IN THE OLD SYSTEM.

1.

Take
Of salt ..... gr. xv
Of water ..... fl. ʒ j
Mix
Sign.—One teaspoonful at once.

2.

Same Latinized.

Recipe
Sodii chloridi ..... gr. xv
Aquæ ..... fl. ʒ j
Misce
Signa.—One teaspoonful at once.

3.

Same abbreviated.

℞
Sodii chloridi ..... gr. xv
Aquæ ..... fl. ʒ j
M.
Sig.—One teaspoonful at once.

4.

Same ingredients for ten doses.

℞	Gm. C. C.
Sodii chloridi	10.
Aquæ	50.

M.

Sig.—One teaspoonful, three times a day, after meals.

5.

One dose; three ingredients.

℞	Gm. C. C.
Sodii chloridi	1.
Syrupi	2.5
Aquæ, q. s. *ad*	5.

M.

Sig.—One teaspoonful at once.

6.

Same ingredients for ten doses.

℞	Gm. C. C.
Sodii chloridi	10.
Syrupi	25.
Aquæ, q. s. *ad*	50.

M.

Sig.—One teaspoonful, three times a day, after meals.

7.

One dose; four ingredients.

℞	Gm. C. C.
Sodii chloridi	1.
Sodii bicarbonatis	.50
Syrupi	2.5
Aquæ, q. s. *ad*	5.

M.

Sig.—One teaspoonful at once.

8.

Same ingredients for ten doses.

℞	Gm. C. C.
Sodii chloridi	10.
Sodii bicarbonatis	5.
Syrupi	25.
Aquæ, q. s. *ad*	50.

M.

Sig.—One teaspoonful, three times a day, after meals.

4.

Same ingredients for eight doses

℞	
Sodii chloridi	ʒ ij
Aquæ	fl. ʒ j

M.

Sig.—One teaspoonful, three times a day, after meals.

5.

One dose; three ingredients.

℞	
Sodii chloridi	gr. xv
Syrupi	fl. ʒ ss
Aquæ, q. s. *ad*	fl. ʒ j

M.

Sig.—One teaspoonful at once.

6.

Same ingredients for eight doses

℞	
Sodii chloridi	ʒ ij
Syrupi	fl. ʒ iv
Aquæ, q. s. *ad*	fl. ʒ j

M.

Sig.—One teaspoonful, three times a day, after meals.

7.

One dose; four ingredients.

℞	
Sodii chloridi	gr. xv
Sodii bicarbonatis	gr. vijss
Syrupi	fl. ʒ ss
Aquæ, q. s. *ad*	fl. ʒ j

M.

Sig.—One teaspoonful at once.

8.

Same ingredients for eight doses

℞	
Sodii chloridi	ʒ ij
Sodii bicarbonatis	ʒ j
Syrupi	fl. ʒ iv
Aquæ, q. s. ad	fl. ʒ j

M.

Sig.—One teaspoonful, three times a day, after meals.

Illustrative Prescriptions.

For Official Pills.

NEW SYSTEM.

℞
Pilulas ferri carbonatis,
No. 10.
Sig.—One pill, three times a day, after meals.

OLD SYSTEM.

℞
Pilulas ferri carbonatis,
No. x.
Sig.—One pill, three times a day, after meals.

N. B.—As these pills are official, and hence ready for dispensing, the word *pilula* is in the accusative case, with the adjective denoting the number of pills desired, agreeing with it in gender, number and case.

For Pills Not Official.

℞

	C. C. Gm.
Arseni trioxidi	.02
Strychninæ sulphatis.	.02
Ferri reducti	1.
Quininæ sulphatis ..	1.

M. Fac pilulas in numero 10.
Sig.—One pill, three times a day, after meals.

℞
Arseni trioxidi,
Strychninæ sulphatis, aa gr. ⅓.
Ferri reducti.
Quininæ sulphatis, aa gr. xx.
M. Fac pilulas in numero x.
Sig.—One pill, three times a day, after meals.

N. B.—Capsules could be ordered by changing the word *pilulas* to *capsulas*. *In numero* may be omitted. The pharmacist uses some simple excipient to make the pill mass.

If the bulk of powdered drugs desired is more than will make a pill of .30 gm. (gr. v), it is ordinarily best to order powders or papers made, and the word *chartulas* is substituted for *pilulas*.

For Rectal Suppositories.

℞

	Gm. C. C.
Morphinæ sulphatis..	.10
Extracti belladonnæ foliorum	.20
Olei theobromatis ...	20.

M. et fac suppositoria 10.
Sig.—Use one suppository as directed.

℞
Morphinæ sulphatis....gr. ij
Extracti belladonnæ foliorum .....gr. ij
Olei theobromatis .....℥ iv
M. et fac suppositoria viij.
Sig.—Use one suppository as directed.

N. B.—Two grams (thirty grains) is the proper size for a rectal suppository.

For an Ointment.

	Gm. C. C.	
℞		℞
Unguenti zinci oxidi.		Unguenti zinci oxidi.
Unguenti aquæ rosæ aa	10.	Unguenti aquæ rosæ, aa 3 ij
M.		M.
Sig.—Use externally.		Sig.—Use externally.

For a Plaster.

℞

Emplastri capsici ....4 x 4 in.

Sig.—Apply as directed.

CLASSIFICATION OF DRUGS.

This classification is based upon therapeutic indications. The drugs named under each heading are those which by their physiologic action best meet the indication.

First Division.

For Local Action.

CLASS I. Drugs used to destroy micro-organisms.

(a) *To disinfect* (Drugs too strong to be used upon the body). For buildings: Formaldehyde, Sulphurous Acid, Steam. For clothing: Formaldehyde, Heat. For dejecta: Chlorinated Lime.

(b) *To inhibit the growth of bacteria upon the body or in one of its cavities* (Antiseptics). Alcohol, Cresol, Formaldehyde solution, Hydrogen Dioxide solution, Mercuric Chloride, Phenol, Salicylic Acid.

(c) *To destroy skin-parasites* (Parasiticides). Betanaphthol, Chrysarobin, Iodine, Pyrogallic Acid, Resorcin, Sulphur, the above Antiseptics.

CLASS II. Drugs used upon the skin.

(a) *To protect* (Dressings). Acetanilide, Bismuth preparations, Boric Acid, Iodine synthetical powders, Lycopodium, Talcum, Zinc Oxide, Zinc Stearate.

(b) *To soothe* (Emollients). Almond Oil, Boroglyceride, Cacao Butter, Glycerin, Olive Oil, Petroleum and Oils, Wool Fat.

(c) *To cause hyperæmia* (Mild counter-irritation). Tincture of Iodine, Liniments, Mustard.
(d) *To blister.* Cantharides.
(e) *To corrode* (Escharotics). Chromic Acid, Glacial Acetic Acid, Nitric Acid, Potassium Hydrate, Salicylic Acid, Silver Nitrate, Trichloracetic Acid.

CLASS III. Drugs used to act on mucous membranes.

(a) *To soothe* (Demulcents). Albumin Water, Barley water, Flaxseed infusion, Milk, Warm Physiologic Saline solution, Slippery Elm infusion.
(b) *To diminish secretion* (Astringents). Alum, Bismuth Salts, Weak Silver solutions, Suprarenal preparations, Tannic Acid, Weak Zinc solutions.
(c) *To stimulate.* Copper Salts, Silver Salts, Zinc Salts.

CLASS IV. Drugs used for local action in the stomach.

(a) *To increase the appetite* (Stomachics). Cinchona, Gentian, Nux Vomica, Vegetable Bitters.
(b) *To aid digestion.* Diastase, Hydrochloric Acid, Pancreatin, Pepsin.
(c) *To reduce acidity* (Antacids). Ammonia, Chalk, Lime Water, Magnesia, Sodium Bicarbonate.
(d) *To cause vomiting* (Emetics). Apomorphine (acting on the vomiting center), Copper Sulphate, Ipecac, Mustard, Zinc Sulphate.

CLASS V. Drugs used for local action in the intestinal canal.

(a) *To increase peristalsis* (Carminatives). Anise, Capsicum, Cardamon, Cinnamon, Peppermint.
(b) *To promote evacuation of the bowels.*

Laxatives	*Purges*	*Salines*	*Irritants*
Aloes	Calomel	Magnesium Citrate	Colocynth
Euonymus	Castor Oil	Magnesium Sulphate	Croton Oil
Magnesia	Compound Cathartic Pill	Potassium and Sodium Tartrate	Elaterium
Podophyllum	A large dose of any laxative	Seidlitz Powder	Jalap
Rhamnus Purshiana		Sodium Phosphate	
Rhubarb		Sodium Sulphate	
Sulphur			

(c) *To correct fermentation.* Betanaphthol, Thymol, Salicylic Acid, Salol.

(d) *To remove Parasites* (Anthelmintics). Aspidium, Betanaphthol, Pepo, Quassia, Spigelia, Thymol.

Second Division.

For Systemic Action.

CLASS I. Drugs used to act on the skin after absorption.

(a) *To stimulate.* Arsenic, Thyroid.

(b) *To decrease perspiration.* Atropine, Sulphuric Acid.

(c) *To increase perspiration* (Diaphoretics). Alcohol, Antipyrine, Pilocarpine.

CLASS II. Drugs used to act upon the genito-urinary system.

(a) *To increase the secretion of the mucous membranes* Buchu, Caffeine, Digitalis, Scoparius, Squill, Water.

(b) *To modify the character of the urine.* Hexamethylenamina, Methylene Blue, Potassium Acetate, Potassium Bicarbonate, Potassium Citrate, Salicylic Acid, Salol.
(c) *To stimulate the mucous membranes.* Cantharides, Copaiba, Cubebs, Oil of Santal.
(d) *To increase menstruation* (Emmenagogues). Iron, Manganese Dioxide, Thyroid.
(e) *To contract the uterus* (Oxytocics). Ergot, Hydrastis, Quinine, Viburnum.

CLASS III. Drugs used to act upon the respiratory tract.

(a) *To increase the secretion of mucous membranes* (Expectorants). Ammonium Chloride (small doses), Ipecacuanha, Iodides.
(b) *To decrease the secretion of the mucous membranes.* Ammonium Chloride (large doses) Atropine, Codeine, Heroin, Morphine, Terpin Hydrate.
(c) *To relax spasm.* Atropine, Bromides, Chloral, Gelsemium, Morphine, Nitroglycerin, Stramonium, Tobacco.

CLASS IV. Drugs used to act on the circulation.

(a) *To stimulate the heart.* Alcohol, Ammonia, Camphor.
(b) *To depress the heart.* Aconite, Veratrum.
(c) *To strengthen the heart.* Caffeine, Digitalis, Strophanthus, Strychnine.
(d) *To contract the blood vessels.* Atropine, Ergot, Suprarenal.
(e) *To dilate the blood vessels.* Nitrites.

CLASS V. Drugs used to act upon the nervous system.

(a) *To stimulate* (Cerebral Stimulants, Antispasmodics, Excitomotors). Asafœtida, Caffeine, Camphor,

Cannabis Indica, Phosphorus, Strychnia, Thyroid, Valerian.

(b) *To depress* (Analgesics; Depresso-motors). Acetanilide, Aconite, Antipyrine, Belladonna, Bromides, Chloral, Opium, Phenacetine.

(c) *To produce sleep* (Hypnotics). Bromides, Chloral, Hyoscine, Paraldehyde, Sulphonal, Trional.

(d) *To produce anesthesia.* General: Chloroform, Ether, Nitrous Oxide. Local: Cocaine, Ethyl Chloride, Ice, Menthol, Phenol.

CLASS VI. Drugs used to lower the temperature of the body. (Antipyretics).—Acetanilide, Antipyrine, Cold, Phenacetine.

CLASS VII. Drugs used for actions which are specific.

Antitoxin in Diphtheria.
Cinchona in Malaria.
Colchicum in Acute Gout.
Iron in Anaemia.
Mercury in Syphilis.
Salicylic Acid in Acute Arthritis.
Thyroid in Myxoedema.

Drugs and Preparations Which May Cause an Eruption on, or Itching of, the Skin.

Antitoxin	Opium
Arsenic	Quinine
Belladonna	Salicylic Acid
Bromides	Synthetic Compounds
Chloral	Volatile Oils, and drugs containing them.
Iodides	

Drugs Which May Change the Color of the Urine.

Drugs that increase its amount cause it to be lighter.
Drugs that irritate the kidneys cause it to be darker.

Methylene Blue causes it to be green, if acid.
Phenol may cause it to be almost black.
Rhubarb may cause it to be brown (same appearance as bile).
Santonin causes it to be yellow, if acid; purple, if alkaline.
Senna may cause it to be red, if acid; yellow, if alkaline.
Sulphonal may cause it to be very dark.
Trional may cause it to be very dark.

Drugs Which Color the Fæces.

Bismuth salts color them black or dark gray.
Colchicum colors them greenish.
Iron colors them black.
Mercury colors them green.
Purgatives cause them to be darker.

Drugs Which Are Excreted With the Milk.

Arsenic	Opium
Bromides	Quinine
Iodides	Sulphur
Lead	Vegetable Cathartics
Mercury	Volatile Oils

DOSAGE.

The doses given in the section on pharmaceutical preparations are the ordinary average amounts for an adult of normal weight and size. These doses are considered safe and ordinarily efficient, but they may be increased or diminished as the exigencies of the case require.

Conditions Modifying the Size of the Dose.

1. Age.
2. Weight.
3. The existing conditions to be combatted, or the object to be attained.
4. The frequency of the dose.
5. The duration of the action of the drug—i. e., the length of time it will take for it to be excreted.

1. **Age.**—This is of most importance in children, and late in life the dose must again become smaller than the adult dose.

Various rules have been formulated for computing the dosè proper for a child. *Young's* formula, perhaps one of the best, is that the fraction of the adult dose proper for a given child shall be that obtained by dividing the age of the child by the age plus 12. Thus, the dose for a child three years old would be $\frac{3}{3+12}=\frac{1}{5}$ of the adult dose.

The following table will simplify for the student the computation of the proper dose for a child. If a child's age is between the ages given in the table, a little less or a little more than the dose computed can be very quickly decided upon. The table will be found perfectly safe, *except in the case of narcotics for young children.*

The fact should be emphasized that however careful we are in calculating the dose for a child according to its age, it is the *weight* of the child that decides the dose more than the actual number of years the child has lived. Thus, a child five years old, weighing no more than an ordinary child of three, should receive the proper dose for its weight and not for its age.

Author's Table for Computing the Dose According to Age.

At 20 years, the adult dose.
At 10 years, ½ the age, ½ the dose.
At 5 years, ¼ the age, ¼ the dose.
At 2½ years, ⅛ the age, ⅛ the dose.
At 1 year, $\frac{1}{12}$ the dose.

2. **Weight.**—The actual weight of the body is really the only scientific factor in determining the exact dose. However, in the physician's ordinary daily routine the determination of the exact weight is impracticable. It must be remembered, however, as above emphasized, that in determining the dose for a child its weight is more important than its age. And it is important to remember that the dose for a small woman at the age of thirty would be much less than for a large, robust man at the age of 25. Therefore, the size of the individual should always be taken into consideration when administering a drug for a specific immediate physiologic action.

One exception, however, to this rule should be made: that is, an over-fat individual of 200 pounds and more would take no larger dose than a normal individual of 150 pounds, his weight being largely in fat and not in blood and muscle.

Normally, it will be remembered that the blood of an adult constitutes about one-thirteenth of his body weight, but this ratio is not true of the over-fat.

A normal baby five months old weighs about 15 pounds, at the end of a year about 20 pounds, at the end of two years about 30 pounds, and from then on the child gains between four and six pounds a year, until at 15 years of age the child normally weighs not far from 100 pounds. Up to this time the girl and boy weigh about the same.

An average man of five feet six inches in height at the age of 20 weighs about 135 pounds; at 30, 145; at 40, about 150; while the average woman of 20, of five feet five inches in height, weighs about 125; at 30 she weighs about 135; at 40 about 140. These figures are simply

suggestive and are the average weights; however, an individual may be perfectly normal and weigh more or less than these figures.

3. The Existing Condition to be Combatted or the Object to be Attained.—This causes the dose of a given drug to vary from its minimum to its maximum. The dose of a drug for its continued tonic or systemic effect would be very different from the dose of the same drug to procure an immediate full physiologic action—as for instance, the dose of quinine to increase the appetite would be very small, but to combat malarial germs must be distinctly larger, and to ward off a congestive chill must be enormous. Also, a patient weakened by fever can take large doses of alcohol without its having any intoxicating effect, particularly true in pneumonia. On the other hand, any brain irritation will allow but small doses of a cerebral excitant. Also diseased conditions of the kidneys or liver make large doses of many drugs unsafe.

4. The Frequency of the Dose.—The frequency with which a drug or mixture is to be given modifies greatly the size of the dose. If a drug is to be given for immediate physiologic effect, and to be given but once, the dose could be very much larger than if it was to be given every hour or two. Therefore, the size of the dose selected should be governed by the decision as to which will have the best effect in a given case—*a large dose,* once or *infrequently,* or *a small dose frequently* repeated. This may be well instanced by the use of calomel as a cathartic, whether it will be best to give one large dose or minute doses every hour.

5. The Duration of the Action of a Drug.—This perhaps more decides the frequency of the dose than the size of it, and really means the rate of excretion of the drug. It is one of the most important points to remember and is the one most frequently forgotten.

Some drugs are quick to act and are quickly excreted or destroyed. Others are slow to act and slow of excretion,

and their physiologic effects are slowly recovered from. There is no better instance of this modification of the dose than by the action of drugs on the heart. The dose of alcohol or ammonia for cardiac stimulation should be small and frequently repeated; whereas it would be bad physiologic treatment to give digitalis in the same frequency, as it should be given, in a dose thought proper, not oftener than two or three times in twenty-four hours. Alcohol and ammonia quickly act and are quickly destroyed in the system, while digitalis acts slowly and is excreted slowly.

Conditions Modifying the Effect of a Dose.

1. Condition of the stomach.
2. Condition of the patient.
   (a) Idiosyncrasy. (c) Tolerance.
   (b) Disease. (d) Presence of shock.

1. Condition of the Stomach, *i. e.,* the rate of absorption. It can be readily seen that a drug in solution taken into the stomach when it is empty, will be rapidly and quickly absorbed and the action immediate and positive, whereas a drug taken on a full meal, even though in solution, will have its action delayed by being absorbed slowly, and thus is more likely to undergo chemical changes which may greatly modify its action. Also, certain drugs may be so irritant as to preclude their administration on an empty stomach. Other drugs may be taken in small doses on an empty stomach, but not in large doses, because they would be ejected. Again, certain drugs may be rendered entirely worthless when taken on an empty stomach, as pancreatin.

The more soluble condition the drug is in or the more soluble it is in an acid medium, the more quickly it will be absorbed from the stomach. Also, the drug might be given in solution, well diluted, on an empty stomach, without causing irritation, when a tablet, pill, or capsule dropped into an empty stomach might irritate the surround-

ing mucous membrane sufficiently to cause pain or even ulceration. Hence, most pills, capsules, tablets, and powders, unless insoluble in the stomach, or inert or bland, or for action on the mucous membrane of the stomach, are always given after meals. The same is true of solutions, unless very well diluted, or for immediate effect, or for local stimulant action on the stomach, as a bitter tonic before meals.

2. Condition of the Patient. (a) *Idiosyncrasy.*—By this is meant a peculiarly intense action of certain drugs on certain patients, i. e., when an intense physiologic action is caused by a dose of a drug which is known in ordinary cases to produce but slight, if any, symptoms. Patients who are found to have an idiosyncrasy against a certain drug should be told what the drug is, that they may caution their future medical attendants against giving them that drug. An occasional patient will be found who cannot take opium in any form without it causing intense cerebral excitement, unless the dose is sufficient to produce profound narcotism. Such persons are very unfortunate, as they must many times suffer pain without relief.

Some patients can take a large dose of a drug when they cannot take a small one frequently repeated. Others, after the first dose of a drug has caused intensely disagreeable symptoms, can afterward, during that particular sickness, take the drug without further discomfort. This is especially true of quinine.

The drugs against which patients most frequently show an idiosyncrasy are *belladonna, iodides, mercury, quinine, opium,* and *salicylic acid.*

(b) *Disease.*—This was touched upon under the discussion of the condition to be combatted, certain diseases causing the doses of certain drugs to be reduced to the minimum, and other diseases causing not only the use of, but giving the best effects from, very large, even enormous doses. This is especially true of syphilis, where mercury or potassium iodide is used in large doses with no bad

effect, and perhaps in epilepsy when large doses of bromides are given. However, in believing or reporting that in a given case an enormous dose of a poisonous drug has not only been well borne, but has seemed to have good effect and no poisonous action, we must not forget that if such a dose was given by the stomach, the stomach might not have absorbed it at all, and such reports should be taken with a good deal of scepticism. In other words, the toleration of unusually large doses of drugs known to have poisonous action is generally due to *non-absorption.*

(c) *Tolerance or Immunity.*—By this is generally meant that a person who has become addicted to the use of a certain drug has acquired a tolerance for, or an immunity to, such a drug or drugs of that class. This is, of course, found in opium eaters and morphine habitués, or in any drug habit. It is also seen in certain diseases, as in malarial fever, where very large doses of quinine can be often tolerated without inconvenience, when the same individual in normal condition can take but moderate doses without its causing cinchonism. Also, protective inoculations can render a person immune against certain poisons. This has been proved with snake venom.

This tolerance is shown in our every-day life by tobacco-users, and by those who are accustomed to take cathartics for constipation. We also sometimes find a peculiar tolerance of narcotics, and many nervous women require enormous doses of a narcotic to quiet their pain or give them brain rest. Such knowledge of the idiosyncrasy and tolerance of a given patient to given drugs constitutes the advantage which the family physician has over a new medical attendant.

(d) *Presence of Shock.*—This condition of low blood pressure, dilated vessels, and almost paralysis of the whole system, is one where little or nothing will be absorbed from the stomach and intestines. Hence any drug administered by the mouth will primarily be inert and useless, or, if the patient rallies, the absorption of large doses, or frequent doses, may cause poisonous symptoms. Therefore, when

there is great depression it is unjustifiable to administer strong or poisonous doses by the mouth, but resort should be had to the hypodermic syringe for the drug treatment of the case.

Cumulative Effect of Drugs.

1. Due to too frequent doses.
2. Due to too long continued administration.

By cumulative effect is meant the unexpected, intense action of a drug after it has been given for some time, as differing from an immediate intense action of a drug which would show an idiosyncrasy.

1. The Too Frequent Administration of a drug which is slow of excretion will cause it to accumulate in the system, and sooner or later produce a poisonous effect. Therefore, as spoken of under the heading of "the duration of the action of a drug," it is very important to remember how long it ordinarily takes a given drug to be excreted. For instance, if a drug that is excreted in eight hours was administered every two hours, at the end of eight hours five doses will have been taken, only the first of which has been completely excreted, leaving three doses acting and one beginning to act in the system.

2. Cumulative Action From Too Long Continued Administration of a Drug means the development of symptoms which show an over-action of the drug. This is of frequent occurrence and is sometimes accidental, but is often caused deliberately by pushing a drug to its full physiologic effect. In cases in which this action occurs unexpectedly and is undesired, the drug should be immediately stopped, and not again given in doses that could cause such an effect. Some drugs give notice of such an impending action by premonitory symptoms; such is true of digitalis.

In some diseases such cumulative physiologic action of certain drugs is desired. The drug is then stopped temporarily, and then again pushed to the point of tolerance, such a method of using the drug giving the best therapeutic results.

The best way to combat such over-action, and which drugs will produce an over-action without danger to the patient, can be learned only by the study of the pharmacology of the drugs.

ADMINISTRATION OF DRUGS.

Drugs reach the system:

1. By absorption from the stomach and intestines after their administration by the mouth in liquids, powders, wafers, tablets, pills, or capsules.
2. By absorption from the rectum after their administration as enemata or suppositories.
3. By absorption from the skin after their inunction or after prolonged contact with the skin.
4. By absorption from the mucous membranes when they are brought into contact with them.
5. By absorption from the subcutaneous tissues after their injection with the hypodermic syringe.
6. By absorption from the deep muscular tissue after deep injection with a long hypodermic needle.
7. By being directly introduced into the blood stream by intravenous injection.

The rapidity of absorption and action, and the size of the dose, varies with the method and route of administration.

The Rapidity of the Absorption of a drug is in the following order, the quickest route heading the list:

When given intravenously.

When given hypodermatically.

When brought into contact with mucous membranes, especially of the nose.

When given by the stomach.

When given by the rectum.

When given by the skin.

The most prolonged action of a drug would be in the inverse order of the list just given. The size of the dose would be in the same order as the list, with the smallest

CHAPTER V.

SPECIAL TREATMENTS.

LOCAL TREATMENT OF THE UPPER AIR PASSAGES.

The pleasantest and perhaps the most useful is medication by means of the *atomizer*.

An almost innumerable variety are on the market, but for all practical purposes they may be divided into two classes: those intended to be used with the hand bulb, and those where the air pressure is furnished by some auxiliary means. The former may again be divided into single bulb and double bulb instruments. As far as results are concerned the single bulb is quite as satisfactory as the double bulb, the chief difference being that the double bulb atomizers produce a continuous spray and approximate more closely the steadiness of the spray produced by the power atomizers.

In selecting a hand atomizer the two points to be borne in mind are: as short a distance from the liquid to the tip of the atomizer as possible and still reach the part desired; a tight and easily working valve in the bulb. For general use the hard rubber instruments are quite as satisfactory as the more expensive metal ones.

If the medicament to be used is very heavy, as an oil, the ordinary instruments will not be found to work satisfactorily and a heavier atomizer will be necessary.

Almost every rubber manufacturer has placed on the market three or four different styles of atomizers, the prices ranging from a few cents to several dollars. The result has been that a large number of these are not only unsatisfactory, but many of them absolutely worthless.

That type of atomizer where the air is furnished by an auxiliary force is more particularly designed for a sta-

tionary apparatus, and consists of several different containers and tips to which may be attached a tube from the source of air supply, which latter is controlled by a small valve. The source of air supply may be a tank or an air pump, furnishing a pressure of from 30 to 50 pounds. This naturally produces a very fine spray, is under more perfect control, and is decidedly easier to manipulate than the hand instrument. For nasal treatments the hand atomizer is better, as the more powerful apparatus can positively injure the delicate mucous membrane.

The solutions used may be classed as:

1. Sedative.—These are alkaline, and may be represented by Seiler's solution.

2. Astringent.—Suprarenal, tannic acid, silver nitrate solutions, etc.

3. Antiseptic.—Boric acid solution, hydrogen peroxide solution, etc.

Insufflation.—Insufflation is the application of medicated powders to mucous membranes by means of a powder-blower.

For general use the simplest form of insufflator is the most satisfactory, consisting essentially of a hard rubber tube and a detachable bulb with a spatula-like nozzle. On this latter the powder to be used is placed, the tip is then slipped on over it, and pressure of the bulb throws the powder where it is desired. It is a particularly satisfactory form of treatment when it becomes desirable to place medication directly upon an otherwise not easily approached position, as for example, the tonsils and the naso-pharynx.

The medicament may be any light powder, but is usually limited to astringents and sedatives. Boric acid is particularly efficacious when applied in this way in cases of tonsilitis.

Inhalation.—This is medication or treatment of the upper air passages with substances which are rendered vol-

atile and so inhaled by means of more or less elaborate ap paratus.

One of the simplest forms of apparatus is known as the "respirator or "mask," and consists essentially of a small hood which fits over the mouth and nose in which is placed some absorbent material impregnated with the substance to be inhaled. A more elaborate affair is constructed of aluminum or vulcanized rubber to conform to the inside of the nostril. It is, of course, hollow and filled with cotton or paper medicated with the drug to be used. When inserted into the nostril it causes no discomfort and cannot be seen.

The different varieties of inhalation apparatus which have been put upon the market are almost innumerable, but for all practical purposes a modification of the ordinary wash bottle, or Woulff bottle, answers every purpose. In using the Woulff bottle the central opening should be used for the medicament, one of the other two openings for the inlet of air, and the other connected by a rubber tube with the mouth or nostril. If the preparation to be used is volatile put a little cotton into the bottle and pour the preparation upon it. If the substance is not volatile or requires heat, place the Woulff bottle in a hot water bath.

In emergency a fairly satisfactory apparatus may be extemporized as follows: Make a cornucopia out of an ordinary piece of wrapping paper, clip off the small end, and, having pinned it so as to retain its shape, place the large end over a bowl of boiling water into which has been put the substance to be used for medication. Cover both bowl and cornucopia with a folded towel and inhale directly from the small end of the cornucopia. If it is desired to use steam, a small tin pan placed over an alcohol lamp takes the place of the bowl.

For the continuous use of steam an apparatus can be purchased for a very moderate price. They are known as "steamers," or "steam atomizers," and are also applicable

where volatile substances are to be used in conjunction with steam.

Another form known as the "croup kettle," is simply a small kettle mounted over an alcohol lamp. It has an elongated spout, which permits the vapor to become sufficiently cooled before it is inhaled.

An elaborate affair termed the "bronchitis tent" is used to cause young children to inhale vapors. Such a tent can be improvised by stretching sheets over a frame fastened to the bed, causing it to resemble an old-fashioned "four-poster." Into this tent is directed by a pipe or tube the steam from a sterilizer, bronchitis kettle, or an ordinary tea-kettle, which is boiling over an alcohol lamp or a portable gas stove.

Various medicaments are added to the boiling water and vaporized, but those most used are mild antiseptics and aromatic oils.

Pastils, Medicated Papers and Medicated Cigarettes.—These are all prepared to burn slowly and to give off vapors of drugs that have action on the mucous membranes of the upper air passages. Most of these are made to relax the spasm of asthma; others are made to relieve coryza. The medicated paper most used is that impregnated with potassium nitrate. The next most frequent ingredient of these papers or pastils is, perhaps, stramonium.

Oxygen Inhalations.—Oxygen is indicated whenever there is dyspnœa or apnœa, whether the cause be gas poisoning (carbon monoxide), oxygen starvation (sewer, well, or cellar gas), profound anesthesia (chloroform, ether, or laughing gas), strangulation (laryngeal occlusion), pulmonary consolidation (pneumonia, tuberculosis, pleurisy, empyema, or tumors), or cardiac failure.

In sudden emergency oxygen may be curative; in chronic dyspnœa it relieves but cannot cure.

Oxygen is supplied in steel cylinders into which it is

compressed. Before administration it is passed through a wash bottle filled with water, which serves the double purpose of washing and moistening it before coming in contact with the mucous membrane of the respiratory tract.

When the valve is opened the gas escapes from the cylinder into a rubber bag (after passing through the wash bottle) from which the patient inhales. Or a stream of oxygen is directed from the wash bottle into the patient's mouth or nostrils. The former is more economical, the latter is the easier for the patient.

Gargles.—Gargling is an efficient means of treating the mucous membrane of the pharynx and tonsils. The quantity of fluid taken into the mouth at a time should be about what would make two swallows for the individual, and half a glassful of sedative or cleansing gargles should be used each time.

After deep inspiration, take the liquid into the mouth, throw back the head, and allow it to flow into the pharynx. Swallow once with the mouth open, then slowly expel the breath through the liquid for about half a minute, the mouth remaining open. If gargling, *i. e.,* expelling globules of air through the fluid in the pharynx, is tiresome to the patient, he can swash the liquid around the throat with nearly as good therapeutic results, although the naso-pharynx cannot be so reached.

To cleanse the naso-pharynx, after gargling, the head should be thrown quickly forward and down and the liquid will reach this cavity. Or the liquid may be snuffed or gently poured through the nostrils into the throat and so cleanse the naso-pharyngeal vault.

Mouth-washes are made of the same liquids used for gargling, and are used with the object of treating the mucous membrane of the mouth and gums.

Gargles are soothing, astringent, and antiseptic.

Examples of *soothing gargles* are: warm physiologic saline solution; hot milk and water, equal parts; the

Liquor Antisepticus of the Pharmacopœia; Seiler's solution; any mild alkaline or mucilaginous solution.

Examples of *astringent gargles* are: tannic acid, or any drug containing it, solutions; potassium chlorate solution; diluted alcohol; weak nitrate of silver solutions; tincture of iron solutions; glycerine solutions, etc.

Examples of *antiseptic gargles* are peroxide of hydrogen solutions; saturated boric acid solutions; Dobell's or other phenol solutions, etc.

Seiler's solution is made by dissolving a Seiler's tablet in one-third of a glass of warm water. Each Seiler's tablet weighs one gram and contains:

℞	gm. c. c.
Sodii Bicarbonatis	.30
Sodii Boratis	.30
Sodii Chloridi	.30
Sodii Benzoatis	.013
Sodii Salicylatis	.013
Eucalyptolis	.013
Thymol	.013
Mentholis	.003
Olei Gaultheriæ	.003

M. et fac tablet No. 1.

The *Liquor Antisepticus* contains most of the ingredients of the Seiler's tablet, but one-fourth of it is alcohol.

Dobell's solution contains:

℞	gm. c. c.
Phenolis	1.
Sodii Bicarbonatis	3.
Sodii Boratis	3.
Glycerini	10.
Aquæ, q. s. ad	200.

LOCAL TREATMENT OF THE SKIN.

Powders.—Protective or Dusting Powders are used on excoriated and irritated surfaces of the body to protect and to prevent chafing. These powders have no medicinal value, but are efficient in furnishing protection and in drying up non-purulent secretions.

The official powders used for this purpose are zinc oxide, zinc stearate, talcum, lycopodium, and boric acid. These should not be confounded with the so-called dressing powders used in surgical dressings and which possess decided antiseptic properties. Several excellent preparations are on the market, as are also a host of cheap, useless ones.

Water.—Acutely inflammed skin should not be bathed, but can be cleansed with some bland thin oil, as cocoanut oil. It should be remembered that mildly irritated skins are soothed by warm water, and irritated by cold water. Warm water is made more sedative by the addition of sodium bicarbonate, borax or bran. Water is made more stimulant to the skin by the addition of sea salt.

Oils and Fats.—Oils are generally used to soothe the skin, and the most sedative is the official alkaline oil, Linimentum Calcis (carron oil). This preparation is mostly used as the first application to burns.

Other sedative oils or fats are olive oil, purified petroleum oils, lard, and wool fat (Adeps Lanæ, lanolin). Several official ointments are used as sedatives, such as Unguentum Acidi Borici, Unguentum Aquae Rosae, Unguentum Zinci Oxidi, and Unguentum Zinci Stearatis. There are also on the market several very elegant soothing solid and semi-solid preparations.

The following are two much-used ointments:

LASSAR'S.

℞ *Sedative.*

	gm. c. c.
Zinci Oxidi	10.
Amyli	10.
Petrolati	20.

SCHÄLPASTE.

℞ *Parasiticide.*

	gm. c. c.
Betanaphtholis	10.
Sulphuris Præcipitati	50.
Saponis Mollis	20.
Petrolati	20.

Inunction. —Inunction is the process of rubbing into the skin oils or ointments that contain a drug, or drugs, that can be absorbed and cause systemic effect. The inner surfaces of the thighs and arms are the parts generally selected for this treatment. Inunction is but little practiced except to thus obtain the action of mercury, in syphilis, if the drug causes unpleasant symptoms when taken by the mouth.

LOCAL APPLICATION OF HEAT AND COLD.

Heat.—*Dry Heat* is most conveniently applied by means of hot water bags. They are made in all sizes from one holding a few ounces to one holding two quarts or more. It is often advisable to have a flannel bag into which the rubber bag easily slips; this is more comfortable to the patient and at the same time a safe-guard against burning.

Dry heat may also be applied locally by a hot brick or a hot iron wrapped in flannel, or best of all, by a hot sand bag.

Ironing is another very convenient method of applying heat, particularly useful in myalgia. A folded blanket is placed upon the bare skin and an ordinary flat iron as hot as can be borne is passed back and forth over the blanket.

Moist Heat, besides relieving pain and changing the flow of blood in inflammation, is very useful in causing relaxation in painful spasmodic conditions, as intestinal, renal, and biliary colic. It is also useful in retention of urine, from sluggishness of the bladder. In these conditions cloths wrung out of hot water and applied over the area of trouble frequently give marked relief.

The simplest method of applying heat locally is to immerse the affected part in hot water. This is, however, seldom practicable except in the form of the foot bath.

A *Dry Compress* is the form of application in which the body supplies its own heat. Several layers of cotton or

gauze are applied to the part, and covered with an impervious material such as oil silk, rubber tissue, or paraffine paper, and the whole is then firmly bandaged.

A *Wet Compress* differs from the above only in that the gauze or cotton is wet when applied. The solution much used for this purpose is a 1:2000 Bichloride of Mercury, which makes an antiseptic poultice. If, however, the dressing is to be applied for more than a few hours a strength of 1:3000 or 4000 is preferable, as it can cause dermatitis. Another efficient solution, and to be preferred if there is no infection to combat, is a mixture of alcohol and water in the proportion of 1:3. This is efficient in reducing localized swelling.

Poultices are often best used as a mixture of kaolin and glycerin, if there is no open wound. There are several such preparations on the market and the eighth revision of the Pharmacopœia makes Cataplasma Kaolini official. It contains kaolin (57.7 per cent.), glycerine, boric acid, methyl salicylate, thymol, and oil of peppermint.

Very useful is the old-fashioned flaxseed poultice, if there is no wound or open ulcer. This is prepared by stirring flaxseed meal into boiling water, adding the meal in small quantities and stirring continuously until the required consistency is reached, i. e., as thin as it is possible to make it without its pouring. The paste should be spread upon several layers of gauze, the thickness of the poultice being not less than ⅜ of an inch. The poultice should be renewed as often as it is necessary to keep it hot, and this will be about every three or four hours. A covering of oil silk, paraffine paper or rubber will increase the length of time that the poultice holds its heat. Several thicknesses of flannel serve the same purpose to a less degree, or better, the hot water bag.

Cold.—Local cold applications are most conveniently made by means of ice bags, which are made in several sizes and shapes to accommodate the parts for which they

are designed. Cold compresses may be used, that is cloths wrung out of cold water, but they have the great disadvantage of the necessity of too frequent renewal.

Extreme cold, as ice applications, should not be applied too long, especially to any part not having active circulation, as the extremities. Also, an ice cap should be kept only very intermittently on a young child's head, and ice on the extremities of very old people should be used with care.

Ice bags are very valuable in all cases of meningitis, cerebral and spinal, to aid in aborting inflammation of the mastoid, some acute inflammations of the eye (where it should be used with care), laryngitis, pericarditis, appendicitis, orchitis, or epididymitis, acute and local inflammations of joints, synovitis, and the inflammation from acute injury, as in contusions, sprains, etc.

In some situations the *ice coil,* although more cumbersome in use, is more comfortable to the patient, and gives satisfactory results. These coils occur in several sizes, but are usually spoken of as the head coil, which is about ten inches in diameter and shaped like a cap, and the abdominal coil, which is about fourteen inches in diameter.

To operate them put one end of the tube into a reservoir containing ice water, placed two feet above the part to be treated, and the other end of the coil into a pail beside the bed. Suction must now be applied to the lower end to start the water running through the coil. Once started a pinchcock should be applied to the tube to regulate the amount of water flowing through it.

Cold Sound. —This is simply a two-way catheter completely closed at its extremity. It is introduced the same as an ordinary sound, but to such a distance that the tip of the instrument extends to, and not into the bladder. Always use a full-sized instrument and start with a water temperature of about 70° F., which subsequently may be reduced to 50°. The bladder should be emptied before

the instrument is introduced. An average duration of treatment would be ten minutes, and the proper frequency once a week.

Rectal Irrigators are instruments, similar to that just described, designed for use in the rectum. Either hot or cold water may be used in them.

HOT-AIR TREATMENTS.

Turkish Baths.—These can only be given in establishments especially provided for that purpose.

Sweat Cabinet.—This is a portable apparatus designed for domestic use and intended to take the place of the Turkish bath. It fails in its purpose, however, as no small part of the benefit derived from the Turkish bath is from the massage, carefully regulated cooling, and long rest insisted upon in the institutions.

Body Hot-Air Treatment.—This necessitates special apparatus the size of which confines it to sanatoria. Its use requires considerable skill both in maintaining a proper temperature and avoiding undesirable physiologic effects.

Properly conducted, the entire body is exposed to a temperature of from 350° F. to 400° F. for about a half hour.

The treatment increases elimination and relieves internal congestion.

Local Hot-Air Treatment.—This also requires special apparatus, some of which are portable. They consist essentially of a specially shaped oven, into or through which the part to be treated is placed, and a series of Bunson burners for heating the oven to the required temperature.

The part to be treated is first wrapped in several layers of Turkish toweling (care being taken that it is closely approximated to the skin, *otherwise a burn will result*), and then supported inside the oven by straps so arranged that no contact with the oven can take place. The open-

ings to the oven are next closed with heavy curtains provided for that purpose and the heat is started. A temperature of from 350° F. to 400° F. should be kept up for a half hour or more. Even these local treatments should not be given by an unskilled person, as dangerous burns are likely to occur. This treatment should not be continued over too long a period.

Vapor Baths.—The Russian bath is the most elaborate of these and cannot be given outside of a bathing establishment, but a most excellent substitute for it is to be had in the so-called "bath cabinets." These are portable and made in two forms. One of wood, or light metal, with folding sides and top, is about a four-foot cube.

The patient sits upon a stool inside the cabinet with his head protruding through the hole in the top. Steam is furnished by a vessel of boiling water placed under the stool upon which the patient is seated. An alcohol lamp or gas stove furnishes the heat.

The other form consists of a light frame over which is hung a rubber tent. This also has a hole in the top through which the patient's head protrudes.

In using these cabinets the patient's head must always be covered with a wet towel, which should be changed frequently enough to keep the head cool.

An efficient vapor bath may be given by utilizing an ordinary bath tub, lined with blankets. The patient is seated in it with a rubber or woolen blanket fastened snugly about his neck and draped over the sides and ends of the tub. Underneath this blanket and into the tub is then introduced a rubber tube leading from the source of the steam. This may be a sterilizer or an ordinary large tea-kettle on a gas stove. Care must be taken that condensed steam dropping from the rubber tube does not fall upon the patient.

The vapor bath may also, with a little care be given in bed. For this purpose the mattress should be covered

with a rubber sheet and over this a blanket upon which the patient, with all his clothing removed, lies. He should be covered with another blanket and a moist sheet, or another light rubber blanket. A "steamer" may be extemporized out of a tea-kettle, to the nozzle of which is attached a rubber tube leading to the bed. The end of the tube should be wrapped in a towel and so covered that neither it nor the condensed vapor from it can come in immediate contact with the patient. As soon as the kettle is boiling vigorously the steam will be discharged through the towel covering the end of the tube and between the blankets upon which the patient lies. With this arrangement there is not enough steam used to require any provision for its escape.

The duration of the steam bath will depend entirely upon the amount of sweating one wishes to produce, and perhaps the best measure is the amount of prostration caused, though to a certain extent the increased frequency of the pulse serves as an indicator. A half hour might be considered an average duration.

If during any sweating procedure headache develops or the patient complains of fulness in the head, the ice cap is indicated, or in its place may be used cloths wrung out of cold water.

WET PACK.

A woolen blanket is laid upon the bed or couch, and upon this a wet sheet. The patient then lies upon the sheet, which is folded about him as follows: Raise the arms above the head and draw one-half of the sheet across the body, its upper portion being tucked along the side of the trunk, the lower portion dipping down between the legs. Now bring the arms down to the sides and pass the other half of the sheet over the arms and body, tucking it in on the opposite side. In this way no two surfaces of the skin come in contact. Then the blanket is tightly

rolled about the patient, care being taken that it is closely tucked in about the neck.

A generous allowance of cool or warm drinks will increase the efficiency of any sweating procedure.

BLOOD LETTING.

Blood is removed therapeutically by venesection, cupping, and leeching.

Venesection.—For this purpose the veins of the forearm are generally selected, first because the arm is easy to get at, second because the veins are easily made prominent, and third because there are several to select from. In performing the operation it is advisable to place a bandage firmly about the arm two inches above the elbow tightly enough to impede the return circulation, but not tightly enough to stop the arterial flow. The right tension for this is easily found by observing the effect upon the veins which in a minute or two will stand out with great prominence.

Having thoroughly cleansed the skin and decided which vein shall be opened (the median basilic or median cephalic is the one generally chosen), grasp the forearm so as to steady the swollen vein between the thumb and finger of the left hand, and while so doing make an incision through the skin down to the vein. It is better to do this rather than attempt cutting skin and vein at one incision; first; because as small a skin incision as possible is advisable, and second, because a vein has a tendency to roll from beneath the knife blade, apparently become lost, and necessitate a second trial. The incision in the vein may be either longitudinal or transverse.

The amount of blood to be withdrawn will, of course, depend entirely upon the individual and the condition, the time to stop being determined by the blood pressure as indicated by the pulse of the other arm.

If, for any reason, the blood ceases to flow freely before

a sufficient quantity has been removed, it is usually due to clotting about the incision in the vein. With a piece of sterile gauze wipe out the wound rather harshly, and the flow will usually proceed at once.

When a sufficient quantity has been withdrawn remove the constriction from the arm, put a compress over the incision, and bandage. If one chooses after the initial incision is made, a stitch may be put in, the ends left loose and tied at the completion of the operation. Of course, the entire procedure should be governed by the rules of asepsis.

Leeching.—Before applying leeches the skin should be thoroughly cleansed. If the leech shows no inclination to take hold a little sweetened water or milk rubbed on the part will usually obviate the difficulty. If it be desirable to accurately place the leech, a glass tube three or four inches in length, open at both ends, and of somewhat greater diameter than the leech, known as a "leech glass," is used. Into this the leech is dropped and the end of the tube placed over the point of application.

A leech will not draw more blood than is desirable. For that reason they are left on until they let go of their own accord, and the amount of blood to be removed is governed by the number of leeches put on at one time, it being usual to put on three or four. If, for any reason, one desires to remove the leech, it can be made to let go by dropping on it a bit of salt. It should not be pulled off.

The Swedish leech will draw about 20 c. c. of blood; the American leech about 10 c. c. The so-called "artificial leech" is a wet cup.

Wet Cupping.—The skin is first cleansed and dry cups are applied to bring the blood to the surface. The skin is then punctured in a number of places, either with the scarifier or the scalpel, and then the dry cup re-applied. It is retained in position as long as the blood continues to flow.

Dry Cupping.—This may be done in several ways. The most elaborate is the method of connecting a vacuum pump with a small bell jar having a cock in its top. This is applied to the skin, and the removal of the air immediately causes a hyperæmia of the part under the bell. In a moment or so the cup is removed and re-applied in the same manner to the adjacent skin.

Another less elaborate method consists of a small glass cup to the top of which is connected a heavy rubber bulb. Grasping this firmly in the hand and compressing it, the cup is applied to the skin and the grasp on the bulb released. This, of course, makes a partial vacuum, and the same effect is produced as in the previous method, but to a more moderate extent.

Finally, and most commonly, is used an ordinary small glass; a whiskey glass or a claret tumbler make a good size. To proceed with this all that is necessary is a candle and a little alcohol. Wipe the inside of the glass with alcohol, light it at the candle, and as the flame is extinguished place the glass on the skin, and in a few seconds the rarefied air in the tumbler will have contracted sufficently to make a very respectable negative pressure, and just as good a "pull" will be obtained as with the vacuum pump. Remove the glass, wipe it again with alcohol, ignite it, and apply as before. This procedure may be repeated until a sufficient degree of hyperæmia has been produced. In removing the cup, whether it be exhausted by air pump, bulb, or alcohol flame, do not try to pull it off by main strength. Press firmly with the forefinger on the skin just at the edge of the glass, and at the same time push the finger under the glass, tilting it with the other hand. This allows the air to come under the edge, and the glass comes off easily.

Aspiration.—This is the removal of fluid from the body by means of suction. It is used to determine the presence and character of fluid, as well as to remove it.

There are several types of apparatus generally spoken of as aspirators, the best known of which is Potain's. It consists essentially of a glass reservoir from which the air is exhausted by means of a small pump, and a fine hollow needle connected with the reservoir by means of rubber tubing. Stop-cocks control the passage both from needle to reservoir and from pump to reservoir.

To use the apparatus the air should be first exhausted from the reservoir by means of the air pump, and its connection with the air pump then closed by the stop-cock. The needle should then be inserted and the cock opened which controls its connection with the reservoir. Under these conditions, if the needle is in contact with fluid, the negative pressure of the vacuum will draw the liquid through the tubing into the receptacle. As long as there is fluid it will continue to flow unless the needle becomes plugged with some debris, or the receptacle gets nearly full. In the former case it will be necessary to withdraw the needle, and by reversing the air pump, force the obstructing matter out of the needle or pipe. In the latter case disconnect the needle tube, *after compressing it,* and then empty the receptacle, which is usually a bottle, then re-exhaust the air and proceed as before.

In using an aspirator the same rules of precaution should be observed as are taught with reference to the trocar. The aspirator has the advantage of a very fine needle whereby the wound, if such it can be called, is very minute; the needle causes little pain in its introduction and it is so small that there is almost no danger from trauma; the suction permits of the removal of fluid, which lack of pressure might fail to expel with other instruments. Almost every organ of the body has been punctured by the aspirator without untoward results. For the removal of pleuritic effusions it is unquestionably the first choice, in which case puncture may be made into the eighth or ninth intercostal space about two inches below the angle of the

scapula, or between the seventh and eighth ribs in the post axillary line. Insert the needle close to the upper border of the lower rib to avoid wounding the intercostal artery.

In aspirating for pericarditis with effusion the puncture is usually made in the fourth intercostal space one inch from the left border of the sternum, the needle being pointed upward and toward the median line. It may also be made in the fifth intercostal space one and one-half inches to the left of the sternum.

In aspirating a joint where there is no sepsis, and recognizing the danger of carrying infection through the skin by the needle, and the difficulty of cleaning the skin, it is a wise procedure to make a slight incision through the skin with the scalpel, and into this tiny opening so made, pass the needle on to the joint.

In introducing the needle it should be grasped firmly and thrust quickly through the skin, then pushed on more slowly until the fluid is reached. When withdrawn the puncture should be sealed with a bit of cotton and collodion or adhesive plaster.

COUNTER-IRRITATION.

The effects of this procedure have been thought to depend upon the vascular relation between the affected organ and the adjacent skin surfaces. This explanation is applicable to superficial affections, intercostal neuralgia, etc., but does not explain the relief given in disturbances of deeper parts, which have an independent circulation.

A more recent explanation is that which has reference to the sensitiveness of the cutaneous nerves and their reflex action on the deeper parts. To this end areas of skin surfaces have been mapped out having such relations with the internal viscera, and both experimental and practical observations seem to confirm these relations, a single ex-

ample of which is that between the kidneys and the skin of the lower lumbar region.

Counter-irritation is produced by anything that will cause a congestion or inflammation of the skin. The varying degrees of irritation are termed rubefacient, vesicant, pustulent, or escharotic action. The first, or mildest, is the most frequently desired, and is produced by dry heat, liniments, and stimulating paints or poultices.

Dry Heat is applied locally by hot water, sand, salt or bran bags, and by various hand stoves.

Liniments are valuable counter-irritants, and do good not only by producing rubefacient action, but by the massage used in applying them. Blistering with liniments is not advisable, hence most liniments should not be applied to the skin on cloths, and only the weaker liniments should be applied to young children. The official stimulating liniments, in the order of their strength, are:

Linimentum Camphoræ.
Linimentum Saponis.
Linimentum Chloroformi.
Linimentum Ammoniæ
Menthol Preparations.

Iodine in the form of the tincture, is the paint most used for counter-irritant action. It is applied with a camel's hair brush, and the application is repeated daily, or at longer intervals, depending upon the reaction. It should not be used long enough to produce either blistering or leathering of the skin. Iodine ointment (Unguentum Iodi) is also used, and may be applied twice daily for a long time without producing vesication.

Ichthyol is used as a counter-irritant, and there are various stimulating preparations furnished in collapsible tubes, the best of which are *capsicum* and *menthol* preparations.

Mustard is a valuable popular rubefacient. A convenient form of application is by medicated papers which are

sold in packages. A paper is moistened and applied to the skin with a single layer of gauze intervening. It is then covered with any protective material and left on for a variable length of time, depending upon the reaction, but to blister with mustard is not advisable, as such a blister is slow to heal.

Quite as commonly used is the home-made plaster, which is prepared from equal parts of mustard and flour (flaxseed meal is better, if at hand). The mixture should be stirred to a paste with warm, not hot, water, then spread upon an old piece of muslin or cotton and applied to the skin. It may be left on from fifteen to thirty minutes. A longer application is liable to produce blisters. If the application is to be made to a child, or to a very delicate skin, the proportion of flour or flaxseed to mustard should be three to one.

A Turpentine Stupe is prepared by wringing out a piece of flannel in hot water, folding it several times and sprinkling a half teaspoonful of spirit of turpentine upon it. It should be applied closely to the part, and, if a leg or arm, bandaged on.

Blisters have almost entirely been superseded by the Paquelin cautery, but when this instrument is not available they may be used in cases of deep-seated inflammation, to reduce swelling, to hasten absorption, to increase secretion, to stimulate the whole body (as in coma), in chronic inflammation of joints, in endocarditis, pericarditis, and pleuritis.

The plaster, or cerate of *cantharides,* is the agent generally used, and is the best. It should be kept on about five or six hours for an adult, and two or three hours for a child. Before applying the skin should be thoroughly cleansed, and shaved, if necessary.

A blister may be produced rapidly with *chloroform.* It is applied by moistening cotton with the chloroform, placing the cotton on the part, and covering it with oiled

silk or a watch glass. A mixture of *ammonia* and lard, equal parts, will rapidly produce a blister, usually in five minutes.

Blisters should not be used on young children, on very old people, or when there is a great debility. They should never be applied over bony parts, or on parts subject to pressure, in the immediate vicinity of scar tissue, directly over an inflamed part, or in diabetes, scurvy, purpura, or the acute exanthemata. Cantharides is contra-indicated in kidney diseases.

The Cautery at present used is either the electro-cautery or the Paquelin. The former consists essentially of a platinum wire, which is heated by the passage of an electric current. The temperature of the wire is governed by the amount of current passing through it, which is controlled by a rheostat. The apparatus derives its source of supply either from a collection of cells, or, more convenient when obtainable, from the street current. A handle conveniently shaped and containing a switch for opening and closing the circuit allows the operator perfect control of the instrument, and in this handle is inserted a cautery tip, i. e., the two wires carrying the platinum terminal. This latter is made in a great variety of shapes adaptable to the kind of work to be done.

The Paquelin cautery, named after the inventor, possesses the advantage of extreme portability and easy manipulation. In operation it depends upon the incandescence of platinum in the presence of a light benzine gas when the platinum has once been raised to the ignition point of the gas supplied. Several different varieties of this instrument are on the market. In using the cautery three degrees of heat are used: a white heat, which is least painful and most rapidly destructive to tissue, a red heat, which is the best for hœmostatic purposes, and a very dull red, just off from the black, for counter-irritation. As a counter-irritant it is superior to blister-

ing, and when so used should be passed very rapidly over the skin, touching it lightly with a whipping motion. This properly done causes almost no pain and produces a series of fine red lines which persist for some days.

Acupuncture consists in the introduction of needles into the tissues either for the purpose of giving exit to fluid, or to relieve pain in neuralgia and myalgia. The operation is said to have been introduced into Europe from China in the seventeenth century. From two or three to eight or ten needles are used, the size being somewhat larger than an ordinary pin. The skin, as well as the needles before they are inserted, must, of course, be surgically clean. They are introduced rapidly with a rotary movement, and cause little pain in their insertion. It occasionally gives almost immediate relief from pain, but quite as many times fails. When practiced for the relief of œdema, a three-cornered surgical needle gives better results than the smooth needle.

IRRIGATION.

Colon Irrigation (*Enteroclysis*).—Several instruments are made for this purpose, the principle of all, however, is the same, namely, a tube within a tube, the inner carrying the supply of fluid, and the outer serving for a drain. An extemporized instrument may be made out of a large and a small catheter, passing the latter through the former and using the smaller for the ingress, the other for the egress.

Also, quite as satisfactory results are obtained by the use of a single tube, in which case a quantity of fluid is allowed to flow into the bowel. The tube is then disconnected from the supply and the contents of the bowel pass out through the tube. The tube may now be connected again and the process repeated till the fluid comes away clear. A tube suitable for this purpose is the one used for enemata, a soft, but rather rigid, tube about eighteen inches long,

known as the "rectal tube." They are made with closed end and side fenestra, as well as with an open end.

The other necessary appurtenances are the fluid to be used for irrigation and a reservoir for containing it, which should be elevated about three or four feet. For the latter may be used any vessel, its contents being syphoned out, but very much preferable is a glass reservoir with an opening at the bottom. This makes it possible not only to see how much fluid is available at any time but also to form an idea of how fast it is discharging. The bottles for this purpose are easily cleaned and possess the further advantage of remaining practically sterile while in use. The size varies, but the larger have the advantage of maintaining the temperature of their contents more uniformly, and are much more serviceable.

In colon irrigation the patient may be in the dorsal position, with the hips elevated, in which case a douche pan will be a great convenience, or a Kelly pad, or a folded rubber sheet may be used.

As the chief object of this procedure is the cleansing of the bowel, a considerable amount of fluid is necessary, but its composition is of secondary importance. The physiologic saline solution is generally used (approximately a heaping teaspoonful of salt to a quart of water), at a temperature of about 100° F. If desired, borax, boric acid, hydrogen peroxide, potassium permanganate, silver nitrate, or other solutions may be used.

Vaginal Irrigation (*Vaginal Douche*).—The reservoir, tubing, and douche pan or Kelly pad, are required. An ordinary fountain syringe with a vaginal hard rubber tip will answer, but a glass tube with side perforations makes the best douche.

The patient must be on her back, and if the perforations are not on the side of the nozzle care must be taken that the stream be not directed into the cervix. The nozzle should preferably lie behind the cervix.

The solutions are almost always hot, always if they are to be continued for any length of time. The heat lessens uterine excitability and contractility and hence relieves pain, and many times will abort what would otherwise terminate in a suppurative inflammation. The temperature should be about 110° F., but may be increased, if desirable, to as high as 125° or 130°. This is as hot as can be borne. Various solutions are used: antiseptics, astringents and physiologic saline, the latter most frequently and most advantageously for prolonged irrigation.

Intra-Uterine Irrigation.—This is used only to control hæmorrhage after parturition, directly after curettement of the uterus, and for uterine sepsis. To stop uterine hæmorrhage the temperature should be as high as can be borne, 125° or 130°. The solution used is physiologic saline or plain sterile water, with every precaution against sepsis taken, and with only a very gentle stream. If the procedure is to be successful it is usually evident inside of ten minutes. In a septic uterus weak antiseptic douches may be used several times a day.

Bladder Irrigation.—There are a number of two-way catheters on the market, but the best has a partition running through a single tube. This form has the maximum ingress and egress for the minimum calibre.

The catheter should be passed as an ordinary sound, entered well into the bladder, the upper of the two ways connected with the reservoir, and the lower with a short piece of tubing leading to a pus pan, or other receptacle. The elevation of the reservoir should not be over three feet, for if too much force is used the bladder is distended too greatly.

The solution, usually a weak antiseptic, should be warmed to 100° F., and every precaution against infection should be taken. In default of a two-way catheter, any ordinary catheter may be utilized by filling the bladder through it, then allowing the bladder to empty, and repeating the operation until the solution comes away clear.

Urethral Injections.—As in the majority of cases these are given by the patient himself, he should be instructed as follows: First, he should always urinate before injecting, to so far as possible wash out the urethra and so reduce the chance of carrying the infection backward by the injection. A suitable syringe holds about 20 c. c. and has a cone-shaped nozzle, preferably of soft rubber.

Having filled the syringe with the solution to be used, he should hold the penis in the left hand, the glans between the forefinger and thumb, which support it from underneath. Hold the syringe in the right hand between the thumb and second finger and manipulate the piston with the forefinger. Next introduce the nozzle into the meatus, and if the thumb and forefinger of the left hand are brought together they will close the meatus down upon the nozzle and prevent leakage during the injection. Depress the piston slowly until the urethra is fully distended. The syringe may now be removed, the left forefinger and thumb closing the meatus and so retaining the injection as long as may be required. This will depend upon the strength of the solution used and the age of the inflammation, usually from one to three minutes. The medicaments used are antiseptic and astringent, and those most employed are zinc sulphate, silver nitrate, various silver organic salts, potassium permanganate, hydrogen peroxide, ichthyol, and simple alkaline solutions.

If deemed advisable the Valentine prolonged irrigation with weak solutions may be used.

Stomach Washing (*Gastric Lavage*).—For this purpose a tube similar in type to the two-way catheter is made of soft rubber, but for ordinary use the plain stomach tube answers all purposes. This may be connected by a two-way cock to the reservoir and an over-flow, allowing first the stomach to fill from the reservoir, then turning the cock and permitting it to empty through the over-flow. Or simply a funnel and a pitcher may complete the equip-

ment. There may be purchased a stomach tube (also known as an œsophageal tube), which terminates in a rubber funnel and has upon it a permanent mark to indicate how far it should be passed in adults. This is the most serviceable form for practical work.

The first introduction of the stomach tube, and sometimes the second, will often cause nausea and retching, but these effects will immediately pass off, and as a rule subsequent introductions are well tolerated. The tube should be first wet, either in hot water or in milk, and then the operator, standing in front of the patient, passes it rapidly over the base of the tongue into the œsophagus, the patient being told to swallow. It may then be rapidly pushed on into the stomach, but for the first few times there is usually less discomfort to the patient if he is told to swallow repeatedly, and the tube advanced as he makes the effort. The mark referred to on the tube will show when it has been introduced far enough.

The funnel end is then elevated and from a pint to a quart, or even more, of the solution to be used poured in. The symptoms of nausea usually disappear as soon as the fluid enters the stomach, and the patient's sensations generally indicate when a sufficient quantity of fluid has been introduced. As the last portion is about to disappear from the funnel compress the tube at its junction with the funnel and invert the same over some receptacle, taking care that it be lower than the level of the end which is in the stomach. The stomach contents will now flow out by syphonage.

Sometimes during the process some solid matter may obstruct the flow before the stomach is emptied, in which case a little fluid poured into the funnel in the original position will usually wash it out, and again pinching the tube and inverting it the emptying may be continued. The process should be repeated till the washings come away clear. This will usually require from four to six quarts of solution.

Ordinarily physiologic saline is used for stomach washing, at a temperature of about 100° F., although plain boiled water answers every purpose.

The best time for stomach washing is when it is empty, consequently immediately after arising is the time usually selected, when the patient has gotten so he can do the lavage himself. Otherwise, late in the afternoon is more convenient.

Gavage (*Forced Feeding*).—Resource is had to the administration of food by means of the stomach tube, or by means of a long catheter passed through the nostrils, when insane patients refuse to eat. The food so introduced must, of course, be thin, but contain concentrated nutrition and be administered properly warmed. From a pint to a quart is given at one time. Meat juices, raw eggs, gruels, and milk are the nutriments most used.

Enemata.—There are two forms, the high and low enema. The latter may be administered with any suitable irrigating tip, but for the former is required a rectal tube, more properly called a colon tube. The tube, lubricated with some bland oil and inserted into the rectum, should be gradually advanced until it has been introduced about fourteen inches. This is much more easily accomplished if the solution is allowed to flow as soon as the tube is introduced and then the tube advanced while the solution is flowing. In the selection of a tube care must be taken not to get too soft a one, as the tendency of a soft tube is to double on itself.

The patient should be either in the dorsal position with the hips elevated, or lie on the right side, the thighs flexed on the abdomen. From 500 to 1,500 c. c. of solution is introduced at a temperature of about 100° F., and the character of it depends upon the action desired. The more commonly used are for catharsis: solution of salt; soapsuds made by stirring castile soap in hot water until suds are formed; a mixture of glycerine and water in the pro-

portion of one to three; if there is tympanites, spirit of turpentine, three-fourths of an ounce to a quart of water; if there is fæcal impaction, olive oil.

Frequently an injection into the rectum with a hard rubber or glass syringe of five c. c. of glycerine to five or ten c. c. of water is very efficient in causing a movement of the bowels, acting very much better than glycerine suppositories.

Instead of the above fountain apparatus for rectal injections, the bulb syringe is often used.

In infants a small catheter, 16 or 18 French, may be used in place of the rectal tube.

HYPODERMATIC MEDICATION.

This system of medication was introduced by Dr. Alexander Wood, of Edinburgh, in 1843.

A great number of syringes for this purpose are on the market, but the three principal types are the all-metal solid piston, the all-glass syringe, and that having a glass barrel with a leather-packed piston. The first is the cheapest, the second the most expensive. The first has the disadvantage that its contents cannot be seen; the second the disadvantage that it is easily broken. A well-made syringe of the third variety is the most satisfactory all-around instrument.

In preparing the syringe for use the medicament, almost invariably in the tablet form, may be dissolved *within the barrel* of the syringe, or external to it. If the former method is used, draw warm boiled water into the syringe and drop in the tablet, and nearly all tablets will be completely dissolved in from five to twenty seconds. If it be preferred to dissolve the tablet external to the syringe, a teaspoon may be used in which the measured water and the tablet are boiled together. After the syringe has been filled screw on the needle and with the syringe vertical, *the needle end upmost,* push in the piston

until all air is expelled. The instrument is now ready for use.

The skin should be cleaned before introducing the needle, and this may be done with alcohol, or a little hot water. The skin should then be pinched up between the thumb and forefinger of one hand while the other hand introduces the needle into the fold of skin so pinched, at a slight angle to the surface of the body. If thrust rapidly and the needle is sharp, clean and perfectly beveled, there is almost no sensation. The piston should then be depressed, steadily, but not too slowly, until the content of the barrel is expressed. If injection is made too rapidly the tissues are distended with such rapidity as to cause pain, while if it is done rather slowly there need be but little discomfort. The site of the injection is of little importance. Avoid, however, the following: the neighborhood of large vessels and nerves, surface veins, the thinly covered bones, and especially sensitive or inflamed regions. The best situations are the arm near the insertion of the deltoid muscle and the inner surface of the thigh, though the region of the biceps muscle, the forearm and calf of the leg are often used.

Intravenous Injection.—The median basilic or cephalic vein is chosen by preference. The skin is cleaned as for a hypodermic injection and a bandage is placed about the arm to make tense the veins, as explained under transfusion. The syringe should have a rather short needle with a short bevel at its point. The syringe having been made ready for use, the arm is held with one hand, the fingers and thumb of which should be on either side of the vein chosen and drawing the skin so as to immobilize the vein.

The needle should now be introduced, slowly upwards into the vein. If it is thrust quickly the chances are that it will slip over the vein without penetrating it, while introduced slowly one can usually feel when the wall has been pierced. If, however, there is any doubt,

draw back the piston of the syringe a trifle, when, if properly placed, blood will immediately pass into the syringe where it may be seen. If the needle is not in the lumen of the vessel practically no blood will be aspirated, and a few air bubbles will make their appearance.

Having made certain of the correct placing of the needle, remove the bandage from the arm and inject the contents of the syringe. If any swelling appears during the injection, it is sure evidence that the needle is not in the lumen of the vein. The injection completed, the needle is withdrawn, and the site of puncture wiped with a little alcohol or bichloride. No dressing is required.

Hypodermoclysis. —This is the introduction of physiologic saline solution into the subcutaneous cellular tissue. Although it is not possible to introduce it quite as rapidly as by the intravenous method, the saving of the time required to find a vein, isolate it, and insert the canula, will at times make this the method of choice. The same apparatus is needed as described in transfusion, except in the place of the canula should be used a large hollow needle. This should be pushed well into the subcutaneous cellular tissue, and the pressure will need to be a little greater than for transfusion, five feet elevation as an average.

The skin should be carefully cleaned before introducing the needle, *which should be inserted while the solution is flowing from it.* The best place, in the female, is the submammary region, where a pint or more may be easily introduced on either side. Next in the order of choice is the subaxillary region. Excepting the submammary region in the female, not more than a pint should be introduced at any one place. If more is desired, re-introduce the needle elsewhere.

The slower the fluid is introduced the better, within reasonable limits, and the rate of 500 c. c. in fifteen minutes should never be exceeded. When the needle is withdrawn the puncture should be sealed with a little cotton and collodion, or adhesive plaster.

Transfusion. —Transfusion is now practically limited to the intravenous injection of physiologic saline solution. Several varieties of apparatus are used for this purpose, but like the majority of emergency operations, the apparatus is too likely to fail when needed most. Consequently the very simplest apparatus is most reliable.

For the successful performance of this operation all that is necessary is a reservoir for the solution, a rubber tube, and a small glass or metal canula. An ordinary two-quart fountain syringe will answer every purpose provided it be made sterile by boiling before it is used. The canula should be tied firmly into the tubing, to prevent any possibility of its coming out during the operation.

The median basilic or cephalic vein is usually chosen, as for venesection, the arm is surgically cleaned, a bandage tied above the elbow sufficiently tight to impede the return circulation and to make prominent the veins. A small incision is made over the vein chosen, which is isolated and picked up. Two ligatures are passed under the vessel but not tied. At this stage the saline solution should be started running out of the canula to insure the absence of all bubbles, and the required temperature. Next a small, transverse incision is made in the exposed vein, and the canula, dripping its warm physiologic saline solution, is inserted into the vein in the direction of the heart. One of the ligatures passed under the vein should now be tied tightly about the canula to retain it in position, and the other tied between the canula and the distal end of the incision. The bandage should next be removed from above the elbow, and the saline allowed to flow steadily from an elevation of about three feet. When a sufficient quantity has been introduced the canula is withdrawn, the ligature which was around it is drawn tightly and knotted, and the wound closed with one or two skin sutures, and an antiseptic dressing applied. Every detail of this procedure should receive the strictest attention to asepsis.

The temperature of the solution should be about 100° F.,

and the amount introduced will depend upon the indication as well as upon the symptoms. Naturally more will be required in a case of severe hæmorrhage coupled with shock, than if there is simple shock to deal with. The condition of the patient and his pulse give the best indication that a sufficient quantity has been given. The rate at which it may be introduced should not exceed 500 c. c. in fifteen minutes, and may be governed by the height of the reservoir.

The so-called "normal saline" solution, .6 per cent. NaCl universally used in irrigation and hypodermoclysis is generally used here, but when so introduced directly into the blood stream in contact with the corpuscles there is no question but that it is not isotonic. In other words, it has not a high enough percentage of solids. A .9 per cent. solution is a much better approximation, and this is the percentage which should be used. Probably the nearest approximation to a "physiologic solution" is this modification of Ringer's solution: Na Cl .90 per cent.; KCl .01 per cent.; Ca Cl .026 per cent.; H_2O 99.064 per cent.

For practical purposes the following solution added to a quart of water makes, in the present state of our knowledge, the best solution to use:

℞

Calcii Chloridi	.25	gms.
Potassi Chloridi	.10	gms.
Sodii Chloridi	9.	gms.
Aquæ	50.	gms.

M.

Sig.—Add to a quart of water.

Antitoxin Injection.—By far the most used of the antitoxin sera is the Serum Antidiphtheriticum of the United States Pharmacopœia. This serum is sold in sealed packages bearing a definite date, later than which the contents of the package should not be used on account of the possibility of its deterioration. The number of antitoxin units which each package represents is printed upon the package. Antitoxin is now furnished in an hermetically

sealed syringe, and the package contains full instructions how to use each particular maker's product.

Antitoxin is always given hypodermatically, and the site of injection is a matter of choice, perhaps the best place being in the abdominal wall or in the subaxillary region. As the bulk of the injection is considerably more than the content of an ordinary hypodermic syringe, injection should be made between the skin and muscle-fascia, i. e., in the loose subcutaneous tissue, so that distention will not cause pain. Strict asepsis should be used in preparing the region for the injection, and the serum should be injected slowly, care being taken to *avoid the blood vessels.* When the needle is withdrawn use gentle pressure for a moment at the point of puncture with sterile gauze or cotton, and then seal with collodion or a small strip of adhesive plaster.

NUTRIENT ENEMATA.

These are indicated in ulcer of the stomach, in persistent vomiting, and when trauma or stricture precludes mouth feeding.

Before giving a nutrient enema the lower bowel and rectum should be cleansed by an injection of physiologic saline, and this should be repeated before every rectal feeding. The interval between the cleansing enema and the feeding enema should be about an hour. The former may be given with the ordinary fountain syringe, but the latter is best given with a large piston syringe and a soft rubber rectal tube.

The rectal tube should be introduced from six to eight inches and the injection made very slowly, after which the patient should lie quietly, and endeavor to retain the enema. The quantity given at each injection will somewhat depend upon the age of the individual; for an adult about 250 c. c., and this four times in the twenty-four hours.

Various artificial nutriments are used for this pur-

pose, but peptonized meat juices, pancreatized milk, and raw eggs are the most valuable. Sugar and salt should be added to the nutriment.

VACCINATION.

The best place for vaccination is on the upper arm over the region of, or just above, the insertion of the deltoid. The outer side of the thigh or the calf of the leg may be used, but on account of the swelling of the inguinal glands and the disability caused, the leg should rarely be used.

The skin of the part selected should be thoroughly cleansed, but no antiseptic used, except alcohol, and then the vaccination should not take place until the part is thoroughly dry. Next scarify a small area of five millimeters (¼ inch) square. If the vaccine-coated ivory is used, its point may serve as a scarifier, or as well a small scalpel or lance. The scarifications are made about a millimeter apart and at right angles to each other in a sort of basket design, and *in no case should be deep enough to draw blood.* Into this scarified area is now gently rubbed the vaccine from the slightly water-moistened tip of the dry ivory-point, or the liquid vaccine ejected from the capillary tube upon the scarified area is rubbed in with the flat of the scarifier. In a few minutes the moistened surface has dried. If it is slow to dry, gentle fanning, *not blowing upon it with the breath,* may aid the evaporation. The vaccinated part may then be temporarily protected by a shield so constructed that it permits of free ventilation.

After a few days, as soon as inflammation has developed, the shield had best be removed and the part protected by a simple linen binder, as a handkerchief.

If there is much exudate cover with linen or gauze moistened with some bland oil, and change the dressing several times a day. The final scab should, if possible, not be detached until it falls of itself.

DISINFECTION.

The value of a disinfectant varies with the object for, and the manner in, which it is used. For instance, corrosive sublimate is not effective when there are large amounts of albuminous matter present, and sulphur dioxide is unsuitable for fumigation when it would come in contact with metallic decorations.

To disinfect the hands of those in immediate attendance on a patient:

Mercury bichloride solution	1-1000
Phenol solution	2½%.
Chlorinated lime solution	1½%.

After handling the patient, and always before eating, the nurse in attendance should immerse her hands in one of the above solutions, or something similar, for several minutes. This, of course, is not the method of producing surgical asepsis of the hands.

To disinfect the body use mercury bichloride in 1-1000 solution for sponging, but 1-5000 is strong enough for a full bath. A 2½ per cent. phenol solution may be used for the same purpose.

To disinfect excreta:

Phenol solution	5%.
Cresol solution	3%.
Copper sulphate solution	5%.
Chlorinated lime solution	3%.
Liquor Formaldehydi	5%.
Corrosive sublimate antiseptic tablet	1-500.

When used for fæces, the solid matter must be thoroughly broken up.

To, if possible, confine the germs of a contagious disease to the sick room, a sheet wet in chlorinated lime or phenol solution should be hung at the doorway.

To disinfect a room it should first be made practically air-tight by plugging the windows, keyholes and register openings. All bed clothing and other cloth materials in the room should be spread out over chairs, or hung over

lines which have been stretched across the room. Then one or two sheets, depending upon the size of the room, should be hung over lines stretched in the room. Each sheet should then be sprinkled with a quart of Liquor Formaldehydi. This, of course, must be quickly done, as the gas diffuses so rapidly that the operator could not remain in the room. The room should then be closed tightly for twenty-four hours, after which the windows can be thrown open and the room thoroughly ventilated. The woodwork and furniture might be wiped with cloths wet in 1-1000 bichloride of mercury solution.

To disinfect clothing or bedding that can be washed nothing is better than boiling for half an hour in water. Clothing that can be wet, but should not be boiled, may be placed in two per cent. formaldehyde solution or 1-2000 bichloride of mercury solution, neither of which will injure the fabric. Clothing that may contain contagious germs should not leave the sickroom, or better, the adjacent bath-room, until bathed for some hours in one of these solutions, even if they are to be subsequently boiled.

Mattresses, comfortables and such articles as cannot be put into water should be disinfected with formaldehyde.

CHAPTER VI.

SIMPLE FOOD PREPARATIONS.

MILK.

Cream should represent at least 25 per cent. of the fats of milk.

Skimmed Milk is the part of the milk left after the cream has been removed, and contains considerable proteid and sugar.

Butter-Milk is the part of the milk left after all the butter-fats have been removed; is not as nutritious as the above, but contains casein, lactin and salts.

Sterilized Milk is prepared by subjecting it to a temperature of 212° F. for fifteen minutes or more. It is not readily digested, and should not be used.

Pasteurized Milk is prepared by subjecting it to a temperature of 160° F. for an hour. This presumably destroys all of the pathogenic bacteria it might contain. Such milk is easily digested, but should not be kept for use many hours after the bottle has been once opened.

Peptonized Milk is prepared by adding a definite amount (depending upon the maker of the preparation) of peptonizing powder (pancreatin and sodium bicarbonate) to a quart of milk. The powder is generally dissolved in a little water before stirring it into the milk. The bottle should then ordinarily be placed in a warm place for an hour, then put on ice to inhibit further digestion. The peptonized milk may then be warmed and used as needed, but it should not be used after it is twenty-four hours old.

Koumyss is prepared by adding about a quarter of a fresh yeast cake, dissolved in a little water, to a quart bottle of milk, to which has been added a tablespoonful of sugar. The bottle should be tightly corked and placed

upright in a cool place, but not on the ice. In two or three days it should be laid upon its side and then occasionally given a slight shake. At the end of five days fermentation is completed, and the preparation should then be pleasantly effervescent, have a sourish taste, and contain not far from two per cent. of alcohol and about twelve per cent. of solid nutriment. If the bottle is not opened at the end of the five days, it should be placed on the ice.

Junket is made by adding a tablespoonful of liquid rennet (or a dissolved tablet of rennet), to a pint of milk to which a tablespoonful of sugar dissolved in water, with a little brandy, or sherry, has been added. The covered dish or jar should then be put in a very warm place. As soon as there is solidification it should be placed in the refrigerator.

EGGS.

Eggs may be given raw either whole, or as the egg-albumin alone. The white of an egg beaten well with half a pint of water and strained, flavored perhaps with lemon, makes what is termed "albumin water."

The beaten up white-of-eggs with an equal bulk of water, to which has been added one or more teaspoonfuls of brandy, makes a nutritious food.

The white of an egg, or the whole egg, beaten up, may be added to beef broth or to a cup of coffee, and so administered.

Raw eggs, after beating, may be administered in a glass of iced lemon juice.

Egg Nogg is made by adding to a raw egg, well-beaten in a little water with a teaspoonful of sugar, half a cup of milk, to which has been added a tablespoonful of brandy or whiskey. The mixture is then well-shaken or stirred, and, if desired, a little nutmeg may be added.

A raw egg dropped into boiling water and removed in

two or three minutes, makes a very digestible half-cooked egg.

BEEF.

Beef Serum or muscle juice, is really an organic extract. It is best prepared by adding to chopped round steak enough water to cover it. This is then allowed to stand one or two hours, and the whole is then expressed through a large lemon or meat squeezer. The liquid so prepared is then kept on the ice and administered in one or two tablespoonful doses, salted if desired.

Beef Juice is prepared by slightly heating round steak in the broiler, then expressing the juice from it with a meat or lemon squeezer. This does not represent the nutritive properties of meat serum, but is nutritious. The blood thus expressed should, of course, be kept on ice, and served salted, as desired.

Beef Tea is prepared by covering a pound of chopped beef with a half pint of water, allowing it to stand for an hour, then heating it gradually to a little less than the boiling point. Add salt and pepper and serve as required. This is more stimulant than nutritious. Beef teas may, of course, be prepared from beef extracts.

SOOTHING DRINKS.

Barley Water is made by adding a tablespoonful of pearl barley to a quart of boiling water. Let it stand on the back of the stove so that it will keep warm for three hours, then strain and add sugar and lemon to the taste. Serve warm or cold, as desired.

Flaxseed Lemonade is made by adding a tablespoonful of flaxseed to a pint of water, and boiling for half an hour. Then strain. add sugar and lemon juice to the taste, and serve hot or cold.

Oatmeal Water is prepared by adding a tablespoonful of rolled oats to a pint of water, boil for half an hour, then

strain and serve with, or without, lemon. If milk is added to make a gruel, it should be sweetened or salted to the taste.

Rice Water is prepared by adding two tablespoonfuls of rice to a quart of cold water and boiling till the rice is thoroughly softened. Then strain and serve salted and sweetened to the taste.

Toast Water is prepared by thoroughly browning white bread, cutting up the crusts, and then covering them with water. After standing for an hour, strain, and serve plain, sweetened, or creamed to the taste.

INDEX.

C.

D.

E.

F.

G.

H.

T.

U.

V.

W.

Z.